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JANUARY, 1944

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DIESEL and GAS ENGINE PROGRESS

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Art Director

FRONT COVER ILLUSTRATION: A U. S. Navy, class YO Tanker, built by RTC Shipbuilding Co. and powered with a single Fairbanks, Morse Marine Diesel.

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DIESEL PROGRESS for January, 1944, Vol. X, No. 1. Published monthly by Diesel Engines, Inc., 2 West 45th Street, New York 19, N. Y. Tel. MUrray Hill 2-7333. Subscription rates are $5.00 for U.S.A. and possessions. All other countries $7.50 per year. Subscriptions may be paid the London office at £1-17s per year.

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"THE DIESEL WILL WHIP THE FOOD CRISIS—IF!"

Veteran Authority on Agriculture and Heavy Equipment Says Unlimited Tractor Use by Trained Operators Can Break Jam

By F. HAL HIGGINS

THE Diesel farm tractor in the hands of operators trained to use it in the latest and most efficient machine hook-ups under the best farm managers can beat the coming food crisis. So declares Mr. J. E. Badley, president of Tractor Training Service at Portland, Oregon.

"Agriculture has become Big Business," says Mr. Badley, "and it has to meet modern business demands for top service. I have found that war has put new emphasis on Diesel service. Diesels are running longer hours and getting more punishment each hour of work. Every minute a Diesel is down is more than golden. Hence, my service of finding and training men to fill demands of farm and heavy construction Diesel dealers has made me more aware of the place of Diesels than ever before. Give the U. S. farmer 1,000,000 new ones and we could add 40,000,000 mechanical man power hours to the American farm which will take up the slack in farm manpower needed for maximum production, while cutting costs in fuel and time now spent in repairing wornout and obsolete tractors. At least 25% of the present 1,900,000 farm tractors are wasting time and fuel from obsolescence and wearout. At least that many more should be replaced with Diesels as fast as they can be manufactured in the next two years. Food can win the war and write the peace—only if we have it!"

Your Old Reporter likes to contact key men who know some of the answers as to what's what, who's who, why, and where do we go from here whenever he finds one he has reason to believe may have an idea that may contribute something in doping out the answers. As he has been in every state this side of the Missouri River plus Chicago the past year, he has seen and talked face to face with a lot of editors, farm leaders, individual farmers who were doing things that lifted them above the herd, and agricultural engineers and University economists. Hence, when he returned to the Northwest recently, he went through the same adventures in interviewing those he knew might have "something cookin'."

Mr. Badley he hadn't seen since his Caterpillar Tractor days when the two ran across each other now and then in the San Leandro office just before the Diesel was put on tracks to reverse the tracktype tractor field and lift Caterpillar to the heights on sensational sales to logging, big farming, contracting and governmental interests. Badley he recalled as having a background of tracktype and wheel tractor sales, service and manufacturing that dated before World War I. So, the opening statement as set down above made him sit up and ask for more of the same thing.

"Diesel tractors," explained Badley, "are practically out as far as agriculture is concerned in the Government plans for this World War II. Yet we hear slogans coming out of Washington like we heard in World War I. 'Food Will Win the War' has grown a tail since then—'and Write the Peace.' Now isn't that just dandy for a rallying cry for the Big Town boys and girls who haven't learned anything outside their books and lectures? But the h— of it is it takes men and machines—trained men on the best machines with the most efficient power we can put in their hands to fight a war on the farm front. Beefsteaks, butter, eggs, bacon and such food items don't grow on trees without a lot of highly specialized and trained management and labor using the best tools available. The farmer today is neither a rube nor a sucker any more, except perhaps on the Big Town stage and radio.

"You want proof of what the Diesel tractor has done that indicates the Government could whip the food problem by turning loose the Diesel tractor so that every farmer could buy all he wants of them to multiply his manpower in food production to the limit? OK, the West is sprinkled with wheat, rice, bean, vegetable,

J. E. Badley, President Tractor Training Service, Portland, Oregon. Opposite page: A Caterpillar Diesel tractor pulling a combine harvester on the steep hills of the Palouse in eastern Washington.

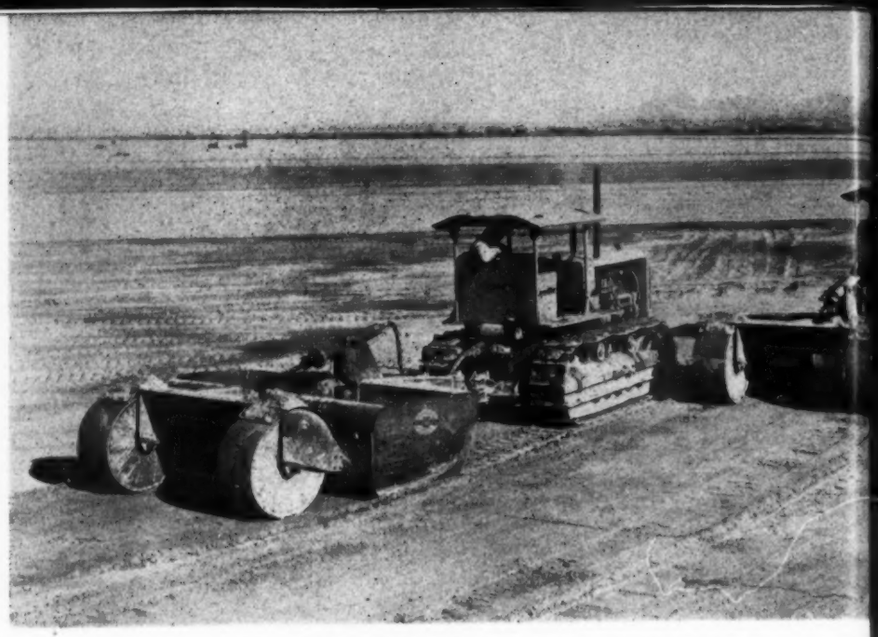
beef, fruit and even dairy farmers who have equipped their farms with Diesel track-type tractors the past ten years to cut their way out of the red and back to profit. The Imperial and Salt River valleys of California and Arizona, respectively, would get top rating in such efficient food production via Diesel tractors.

They work their machines at farming the year round in those areas and have no competitors in the world of food production per man. They use the biggest tractors built—D7's and D8's of Caterpillar brand with similar sizes in Allis-Chalmers, International and Cletrac makes. But, when the farmers want to buy more tractors to enlarge on their efficiency in this kind of farming they get a lot of paper work, endless delays, headlines in the papers, evasions, red tape, brush-offs, radio pep talks, stalls, but no encouragement. Such farmers are looked upon as 'too big' and against the 'little farmer' by Washington clerks. In fact, one key OPA official not over a year ago referred to the efficient dealers who have sold and serviced these farmers as 'those big x@!! we are after.'

"I have been contacting a lot of the Governmental agencies in finding them trained service men for tractors and heavy equipment on such big jobs as the Alcan highway, shipyards, airports up and down the Coast, Army and Navy installations, etc. So, I know how important it is to have trained men to both service and operate this highly important machinery in these war times when every minute is doubly valuable, and a lost hour can never be recaptured. I find now that a lot of my boys in the shipyards are trying to get out of them and into good sound dealer and manufacturer shops where Diesels are being serviced.

"In the old days with the early tractors, the operation service, and maintenance work was more or less of a hit-and-miss proposition. Most repairs could be taken care of by the cross-road mechanic. The introduction of Diesel changed all this. The new efficient Diesel constantly lowering production costs through new uses and methods, must be manned by technicians, who know all the answers, so a new engineering science had to be built around Diesel tractors and equipment. The finest tool is useless, unless it is in the hands of a skilled artisan, who knows how to make use of its full potentialities. It wasn't enough for the tractor man to know the mechanics of one machine.

He must know all machines, as well as the equipment to work with them, and have a basic knowledge of engineering governing logging, agriculture, construction, etc. Such a program was worked out by Tractor Training Service in 1938, which is proving to be the handle to fit the tool of tractor use. We can say with certainty that competent, trained Diesel men in every branch of this industry, can be furnished in any needed quantity to use to the fullest extent this new power, and the equipment necessary to adapt it to each job."



Above: Four 50 hp. Diesel tractors clearing an Arizona desert for food production. Each tractor equals 1200 man power.

Right: A Caterpillar Diesel tractor grubbing out trees to clear the way for an airport in Oregon.

Main office of the Caterpillar dealer for Spokane, Eugene and Portland handling tractor sales and service for the logging, contracting, farming industries and government projects.

The fact that British and German tractor programs were laid out at the outset of the war more than three and a half years ago, to lift their food production to the highest point in man labor efficiency ever obtained was pointed out at this juncture. England has upped its tractors 130% since war started, and now produces two out of the three meals consumed by its population, according to British Food Minister Hudson. Germany went even further and has upped farm tractor use 260%, according to the California Farm Bureau. Both are produc

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Cummins Diesel service truck leaving the Branch at Portland for a hurry-up call out in the timber country.

Idaho dry land farming with a Caterpillar Diesel tractor pulling a one-way disc plow. Two of these outfits are

ing food as never before in their history, going up in mechanized agriculture while the U. S., under Diesel farm tractor ban, is sliding backwards and starting to face the fact that its mechanization ideas as handed out at Washington are not only asinine—they are disastrous and must be corrected at once if the food situation isn't to lead to bread riots before war ends.

"Yes, and the irony of this British tractorization," said Badley, "is that theirs are all American tractors, either built here, or, as in the case of Ford and Massey-Harris, in British factories from American patents and design. It also lifts these two European countries ahead of the U. S. in farm mechanization after we had been over a century raising the American standard of living on the savings gained by farm mechanization that shifted populations from farm to industry, commerce, the professions, services, and leisure to shorter hours and higher pay. Now, we are stopping progress and starting to slide behind in supplying farm tractor needs.

"But an immediate reversal of this trend and the building of 100,000 Diesel tractors for U. S. farming next year could change the picture and start to get the U. S. food-farm back on top. The whole U. S. farming system should be stepped up with a million new tractors as fast as they can be built and sold to any and all farmers who want to buy them with the machines and tools to be powered by them. In fact, it would be a fine time to put the Diesel back in wheel tractors and let them go on from where they were starting three years ago when Government stopped their building. Anyway, we should get these tractors at work at the earliest possible moment and then stimulate the whole U. S. farm food production front by handing every farmer in every area the latest methods and short-cuts to go with the tractors.

Specially trained operators who know both tractors and these methods are essential to top results. Take the bale loaders in the Imperial Valley, the U. S. alfalfa growers could use 20,000 immediately. The DeCarli milking system should be installed in at least 10,000 key areas to stabilize and save the whole milk industry by allowing a few highly trained men to draw top wages equal to those drawn in the war industries. With Diesel tractors producing the dairy feeds at most economical man hours, the thing can be whipped inside a year—and in the American way: high wages for labor with more pleasant work: butter, milk and cream for the consumer: with management and capital getting a fair share for its risks.

"Now, another thing: this great tractor and farm machinery industry from the big factories at Milwaukee, Chicago, Cleveland, Peoria, Racine, Moline and such Mid-west spots on out to its branches and dealers with their service trucks and shops that get out to the farm and keep the tractors rolling is the world's most efficient food producing tool of the farmer. It was built to the farmer's order and rose to importance with Agriculture as it served him more and more efficiently. Not until the tractor arrived about the time of World War I did it begin to really build up to its modern scale and importance. I can recall only too well how small and inefficient tractor service was back in the pioneer days of starting to power up the farm with tractors. Only the best survived. But when the Diesel arrived, there came a new step-up to higher efficiency and standards to meet the demands of farmers and loggers ordering such service."

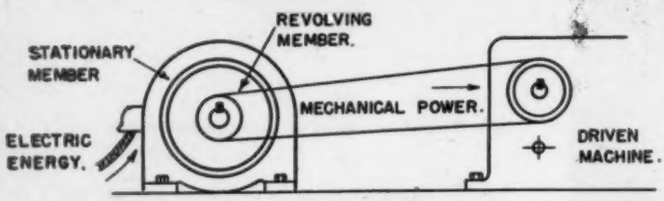


Fig. 1. An electric motor has a stationary member and a revolving member. It converts electric energy into mechanical power.

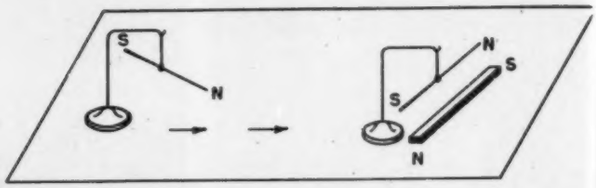


Fig. 2. The north pole of the free magnet is attracted to the south pole of the fixed magnet.

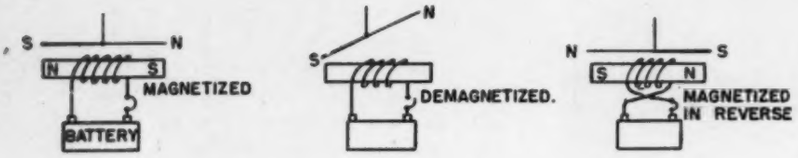


Fig. 5. Electromagnets are strong and controllable.

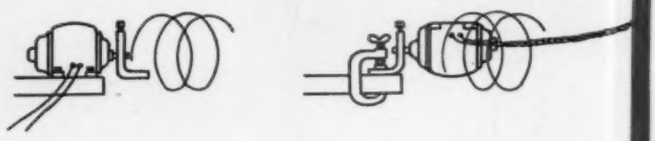


Fig. 6. The motor-frame can be stationary with the shaft revolving or the shaft can be stationary with the frame revolving.

WHAT MAKES AN ELECTRIC MOTOR RUN?

By R. H. ROGERS*

AN electric motor consists of two members, one that is stationary and one that can revolve. (Fig. 1). Each has electric conductors in or around parts made of thin steel laminations, together with such supports and fastenings as are necessary to make them usable.

When electric energy is supplied to the conductors, the member that is free to turn revolves and delivers mechanical power through a belt, chain, gear, or coupling to the driven machine.

FUNDAMENTAL PRINCIPLE

If a magnet that is free to turn is brought near a fixed magnet, the free magnet will turn to line itself up with the fixed one with its north and south ends opposite the south and north ends of the fixed magnet. (Fig. 2.) This is a fundamental principle of magnetism — *unlike poles attract; like poles repel.*

When the free magnet turned, it did so vigorously, twisting the suspending thread. It did mechanical work.

ROTATION ESTABLISHED

Suppose one bar of iron is laid across another and a magnetized needle is suspended by a thread over the crossing point. Since the iron pieces are not magnetized, the suspended magnet can point in any direction. (Fig. 3.)

Now, if by some means, the bars are magnetized and demagnetized so that given poles appear in rotation, the free magnet turns to follow the successive locations of north and south poles. The free magnet is thus made to revolve continuously and we have a miniature motor. (Fig. 4.)

ELECTROMAGNETS

We have means for rapidly magnetizing and demagnetizing iron and reversing its north-south characteristic. A coil of wire around iron will make a magnet of it when electric current is passed through the wire. If the iron is of the proper kind it will lose its magnetism almost instantly when the current is shut off. If the current is started again in the reverse direction the iron will be magnetized with N-S where S-N was before. The polarity is said to be reversed. (Fig. 5.)

This is an electromagnet—much stronger than a permanent magnet and subject to control, i.e. ON-OFF-REVERSE with great rapidity.

PUSH AND PULL

To go back to the motor—both the stationary member and the revolving member are largely electromagnets since the windings, through which electric currents flow, are wound around sections of iron. These sections of one member will be made alive-dead-alive again with polarity reversed in a regularly repeated cycle. The sections of the other member will stay alive with polarity unchanged.

The reaction — push-pull — between magnets makes it possible to hold either member still and to let the other member revolve. The effort that makes a motor shaft revolve one way is trying equally hard to revolve the stationary part the other way. Whichever member is free to turn will turn. (Fig. 6.)

Motors are built with the constant polarity member (i.e. magnetized needle, in the example) either rotating or standing still and conversely with the reversing polarity member standing still or rotating. Circumstances of design determine which way it will be.

The poles on the rotating member are kicked along by the poles behind and pulled along by the poles ahead. (Fig. 7.) As soon as a pole "comes abreast" of the pole that is pulling it, polarity changes and a new set of kicks and pulls are established. The sum total of all the kicks and pulls on all the poles of the rotating member is the turning effort or torque of the motor.

There are strategic times at which to reverse polarities in each revolution. (Fig. 8 and 9.)

HOW POLES ARE REVERSED

Reversals are effected with time precision in one of two ways. With alternating current, the

* Industrial Engineering Division, General Electric Company.

g. 3. A magnetized needle suspended by a thread with swivel has no reason for revolving.

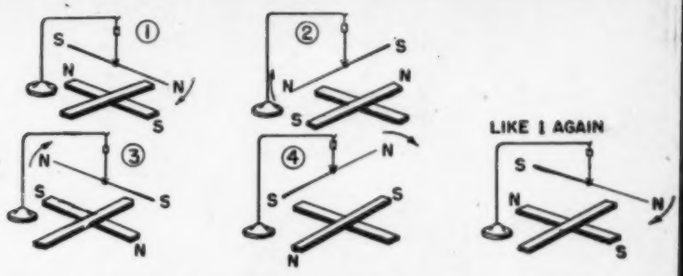
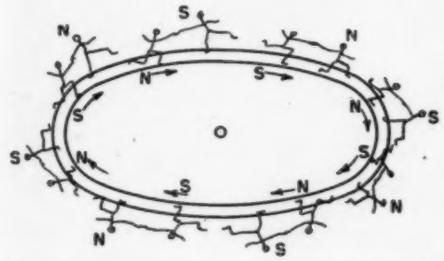


Fig. 4. This series shows how the needle revolves as it follows unlike poles in rotation.



7. The men on the inner circle are being kicked and pulled along. The men on the outside circle reverse their attitudes as the inner men pass by.

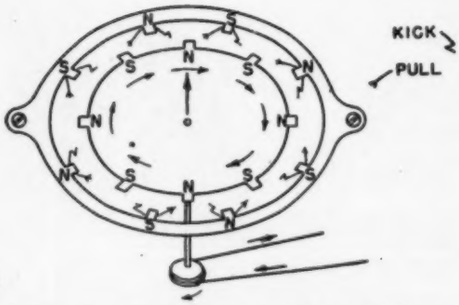


Fig. 8. The poles of the revolving member are kicked and pulled by the poles of the stationary member. Watch the arrowed N.

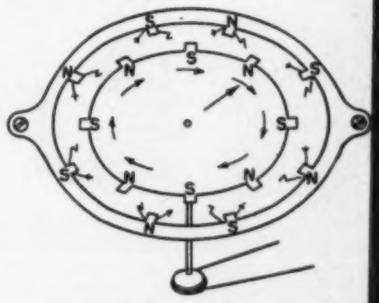


Fig. 9. The arrowed N has moved to a new space but it again has an N behind it and an S ahead.

alternations themselves reverse the polarity of a magnet with each reversal of current flow. (Fig. 10.) The current and hence the poles in one member reverse 120 times per second when the electric system has a frequency of 60 cycles.

In direct-current motors the reversals are caused by the revolving member itself through something like sequence valving action of the commutator and brushes.

By the time a pole on the rotating member has reached the point of greatest attraction (A in Fig. 11), its polarity is changed because its commutator bars (B-C in Fig. 11) (terminals of the coils) have passed to brushes of opposite sign (B-C in Fig. 12). That is, the bars that were in contact with plus and minus brushes are now in contact with minus and plus brushes and current through the magnetizing coil is reversed. What was a north pole in Fig. 11 is a south pole in Fig. 12.

Note, with direct current, one power line is plus and the other minus all the time, while with alternating current the lines change through plus-and-minus to minus-and-plus with great rapidity. (Fig. 13.)

To recapitulate then, we may say that a motor runs because poles of one polarity are chasing after poles of the opposite polarity and are being pushed along by poles of the same polarity. But, will-of-the-wisp like, the moving poles never get to the attracting poles because that desirable point is always just ahead, because of the timely reversals of current in alternating-current motors, or the equally timely action of the commutator in direct-current motors.

Fig. 10. A magnet in an alternating-current circuit.

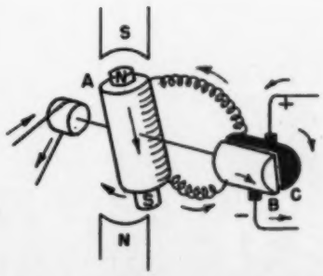


Fig. 11. In a direct-current motor, just as a moving north pole comes to a fixed south pole, its coil terminals (commutator bars) contact brushes of opposite polarity and the moving pole becomes a south pole.

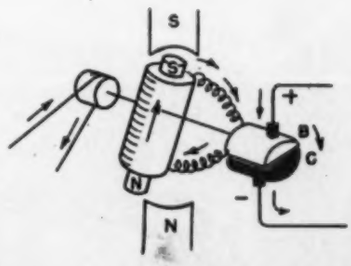


Fig. 12. The moving south pole is now trying to get away from the fixed south pole.

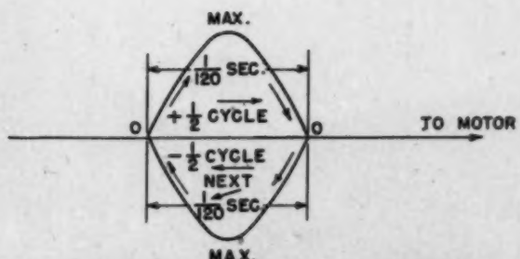
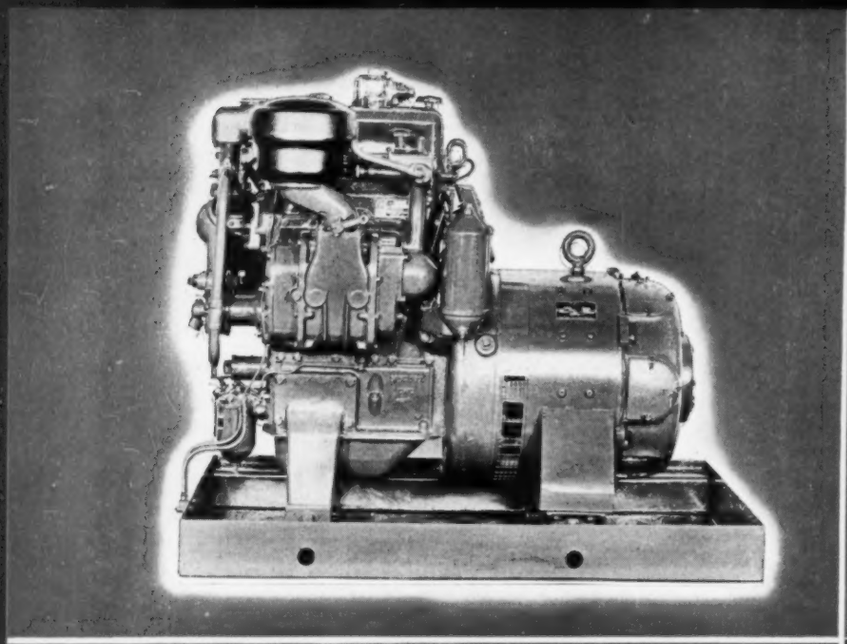
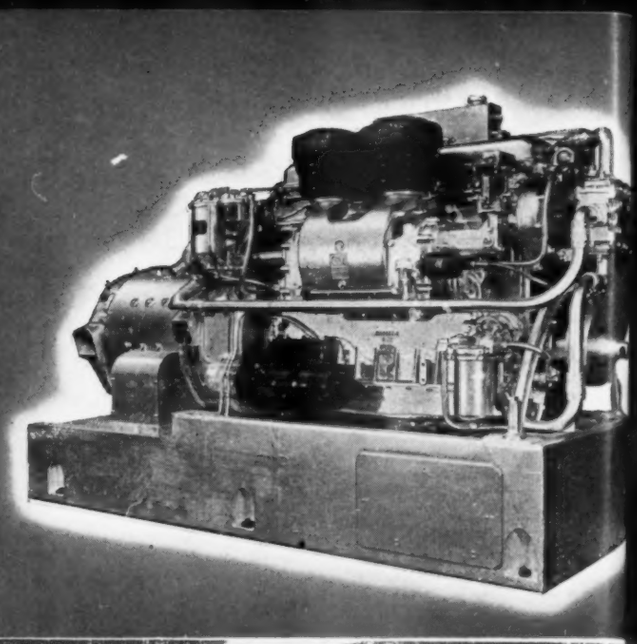
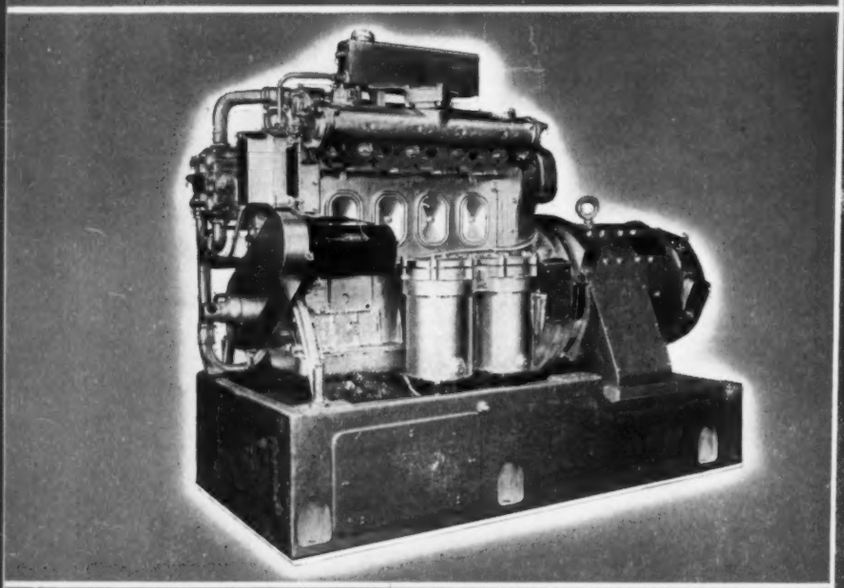
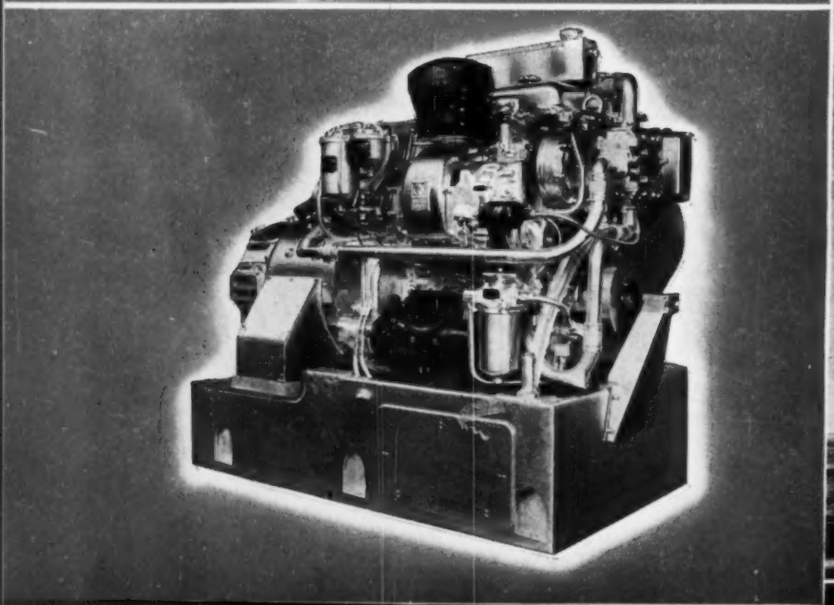


Fig. 13. In an alternating-current system, voltage (pressure) and current (flow) rise from 0 to a peak and then decay to 0 twice in a cycle--once each way.









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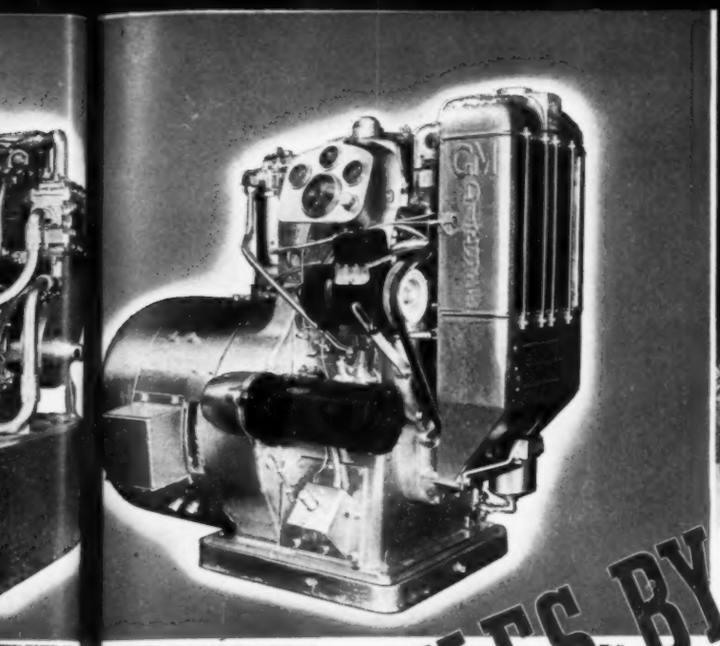

ND MUSCLES BY GM

● A MODERN SHIP is a bundle of nerves—nerves that control signaling apparatus, navigation devices, lights, pumps, all kinds of auxiliaries.

These must be supplied with never-failing power.

This is why thousands of vessels sailing the seven seas under GM Diesel power also have GM's tireless, frugal, easy-to-maintain engines supplying power for their auxiliary requirements.

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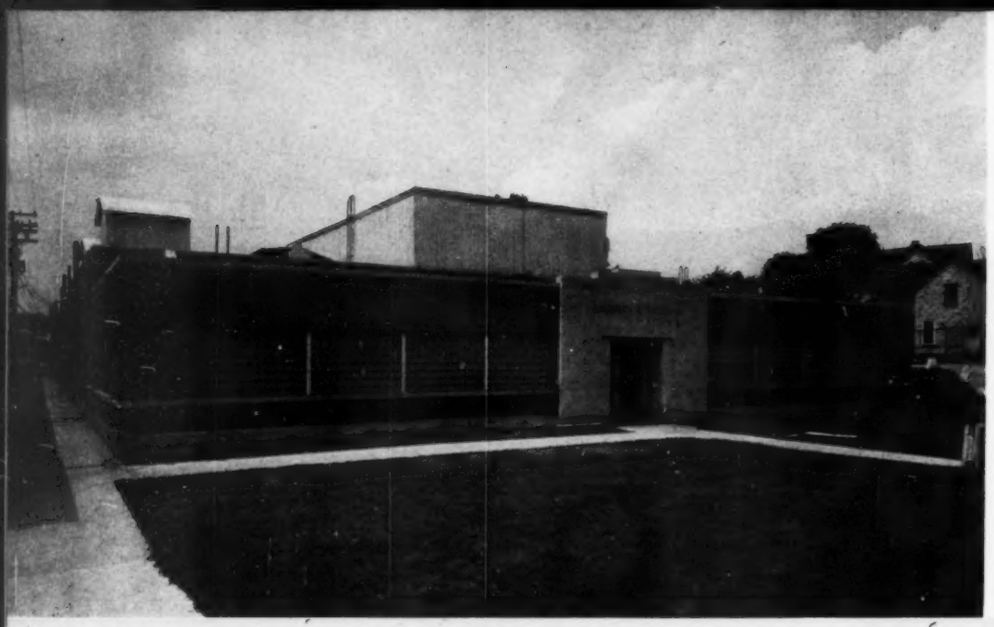
LOCOMOTIVES *ELECTRO-MOTIVE DIVISION, La Grange, Ill.*



Exterior of the modern research laboratory at the Springfield, Ohio, plant of National Supply Company.

RESEARCH TO PRODUCE BETTER POSTWAR DIESELS IN NEW SUPERIOR LABORATORY

TO speed the development of better Diesel engines—not only for present war use, but, particularly, for peacetime industrial and marine applications—the Superior Engine Division of The National Supply Company recently placed in operation at its Springfield, Ohio, plant a modern and complete engine research laboratory.

Researchers at this giant new laboratory are currently engaged in testing Superior Diesel Engines now in production and in developing and testing new types in the experimental stage.

Tests conducted on engines in production, beginning with the testing of the steel used in their manufacture, are so thorough the laboratory guarantees "no unknown factor" in any Superior Diesel.

The new laboratory is reported to be one of the most completely equipped in the Diesel industry with a vast collection of modern research apparatus and the finest-testing machines and instruments available. Much of this equipment was especially designed for the study, analysis and testing of Diesel engine performance. Test cells are provided with dynamometers capable of testing engines from 20 to 2000 hp.

In addition, the laboratory is equipped to make engine fuel and lube oil consumption tests; engine heat balance tests; engine noise level tests; intake, exhaust, and cylinder pressure studies using Maihak, Cox or R.C.A. pressure recording equipment; water and lube oil pump calibrations and tests; Bosch fuel pump and nozzle tests, calibration and adjustment; tests of governors and general engine accessories; studies of engine vibration characteristics covering torsional, lateral and wheel shimmy characteristics; dynamic strain measurements; visual study of vibration of engine parts; and studies of generator voltage wave form.

The chemical and metallurgical laboratory has, among other equipment, apparatus for microscopic examination of metals; chemical analysis, gravimetric and volumetric; spectrophotometric analysis; physical testing, including a 120,000 pound universal testing machine with stress strain recorder; fatigue testing and impact testing; heat treating; profilometer; hardness testing and magnaflux testing.

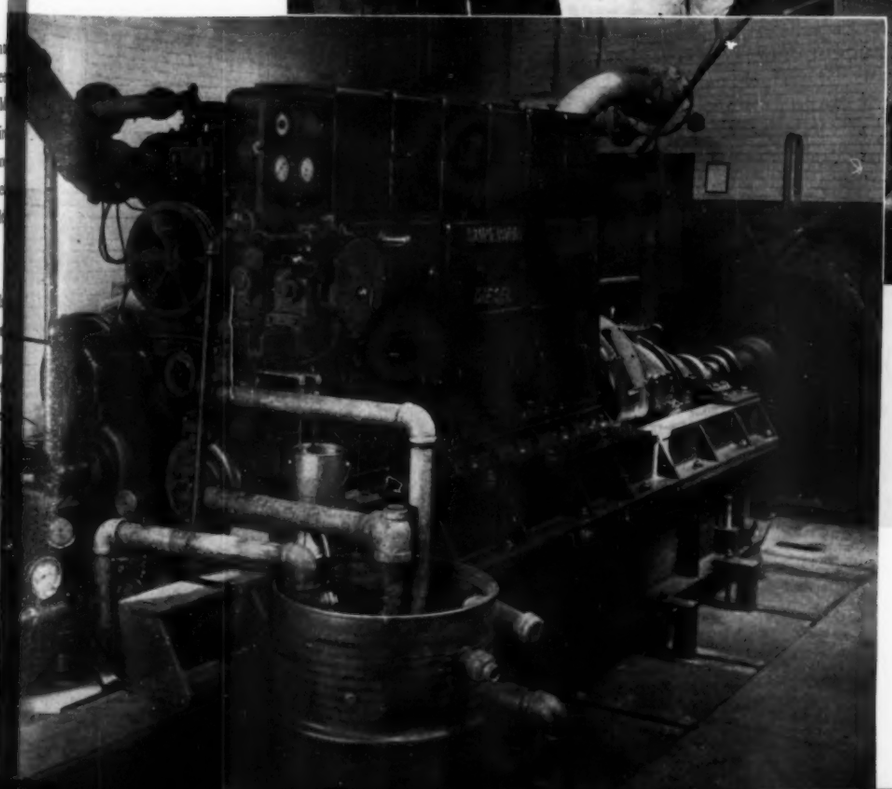
The new laboratory, which, with equipment, cost approximately one-half million dollars, is of brick, stone and glass block construction, 231 feet long by 100 feet wide. There are no windows—lighting is by an improved fluorescent system specially arranged to permit crane operation. The ventilating system filters and tempers all air drawn into the building, thus excluding all dust and dirt from the plant and its operations. Across the front of the building are located the air conditioned lobby, offices, drafting room, and chemical and metallurgical laboratory. Glass block walls provide additional lighting for these rooms.

The remainder of the structure is divided into three parts. The center or main bay is 30 feet wide and extends to the rear wall of the building with a 10-ton crane traveling its entire length. The north bay contains the machine shop, with equipment for machining the necessary test parts. Here are also located the model and small parts shop and the tool room.

The south bay is divided into eight test cells each paired with a soundproof control room containing various gauges and instruments connected to the engine undergoing test. Between each control room and its corresponding test cell is a large double-paned window of shatterproof glass through which the operator can keep the engine undergoing test under constant visual check.

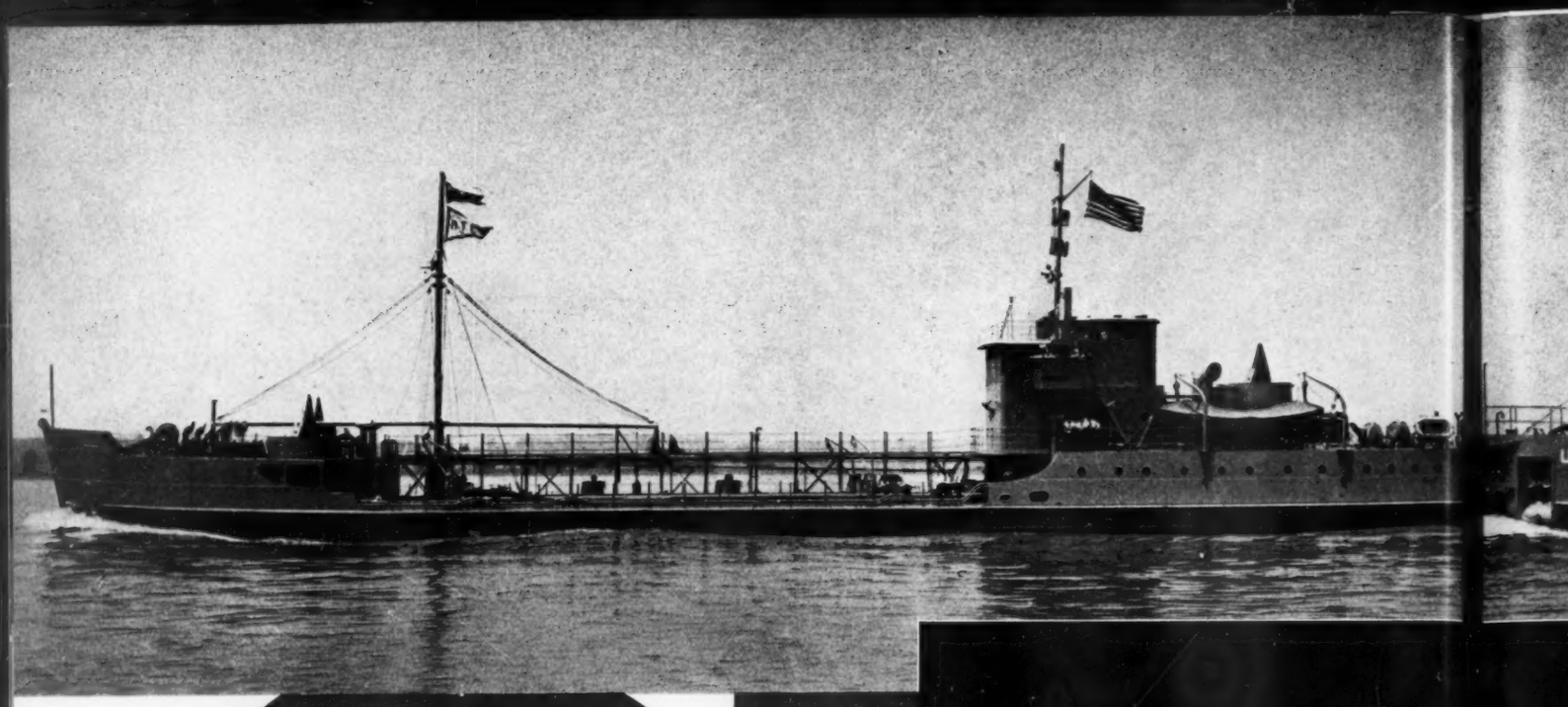
Main bay of the laboratory with 10-ton crane. Test cells right. Photo taken with building lights only.

e on test block seen from proof control room. Elec- control is seen right of w, other instruments and , below and left of win-



Above: Tortional vibration tests are electrically recorded for later study and analysis.

Left: Test cell No. 8 with a Superior 8½ x 10½ in., 6-cylinder Diesel on test with Midwest dynamometer.



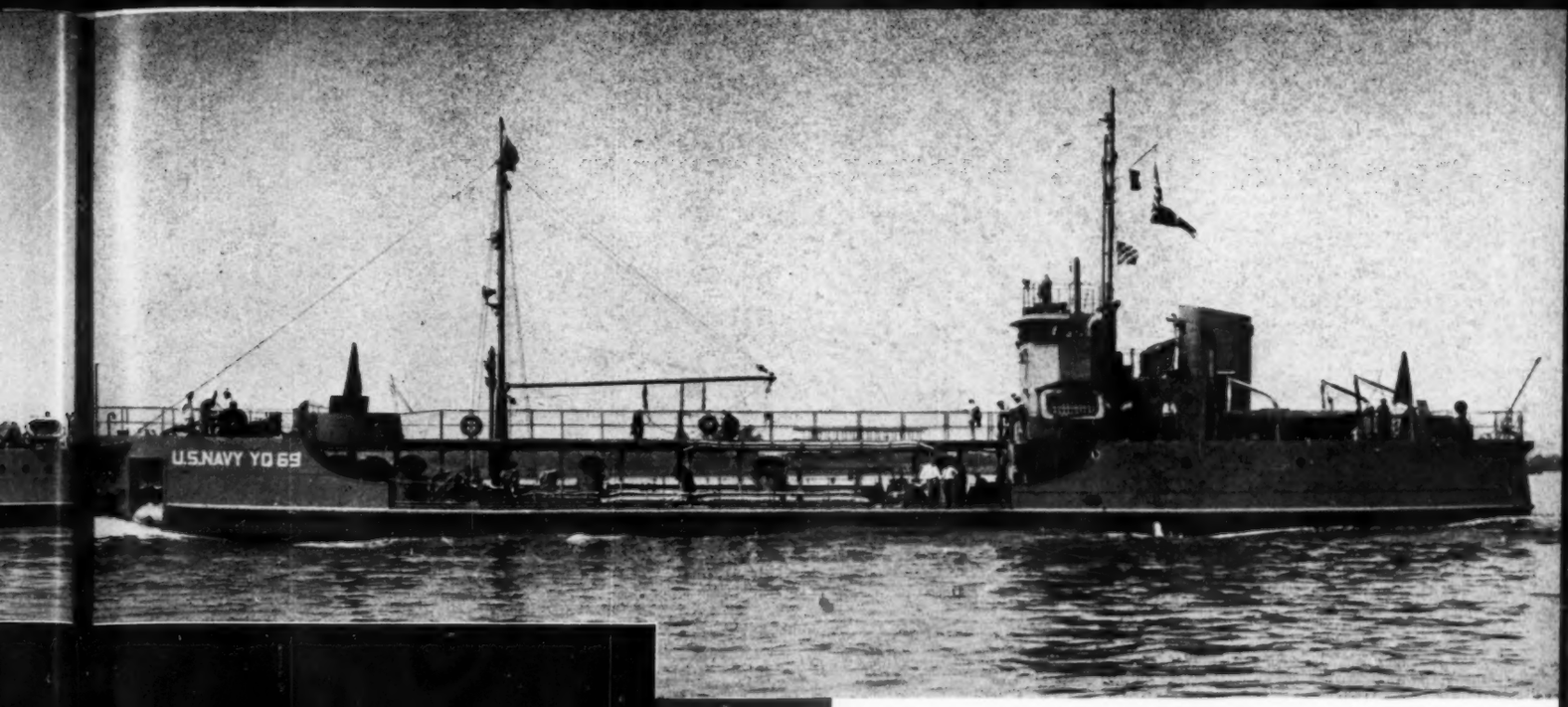
One of the R.T.C. built 235 ft., twin screw, Diesel tankers on trial run.

BUILDING DIESEL TANKERS IN JIG TIME

By HENRY J. BARBOUR

JUST short of four years ago, March 1, 1940 to be exact, the site of the now bustling R.T.C. Shipbuilding Company yards was a four acre lot of windblown weeds and shanty town in Camden, New Jersey. Came Leroy M. Robinson, President, George R. Taylor, Vice President and J. P. Carson, Treasurer and Secretary—the R and the T and the C, with an aggregate of 100 years of shipbuilding experience between them and in three weeks their first keel was laid—a tank barge. This barge was completed and delivered in a short five months after the first stroke of a weed hook in the yard—followed shortly by another—the "Amboy" for the Pennsylvania Railroad.

Then a series of Diesel tankers. First the *George H. Whitlock*, started in September 1940 and delivered to Spentonbush Fuel Transportation



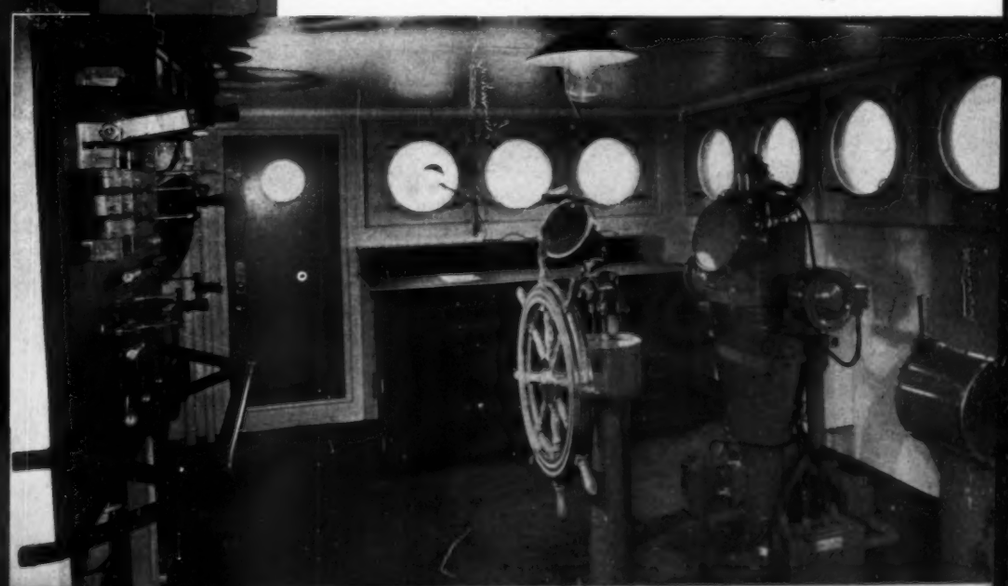
A YO class, 174 ft. Diesel tanker, built by R.T.C. on trial run.

Company February 27, 1941. The *Whitlock* was followed in rapid succession by tankers *F. W. Loyd* and *T. W. Drennen* for Spentonbush, the *John P. Cadell,* for Chester A. Poling, Inc., then the *George W. Whitlock II* and *A. C. Dodge* for Spentonbush.

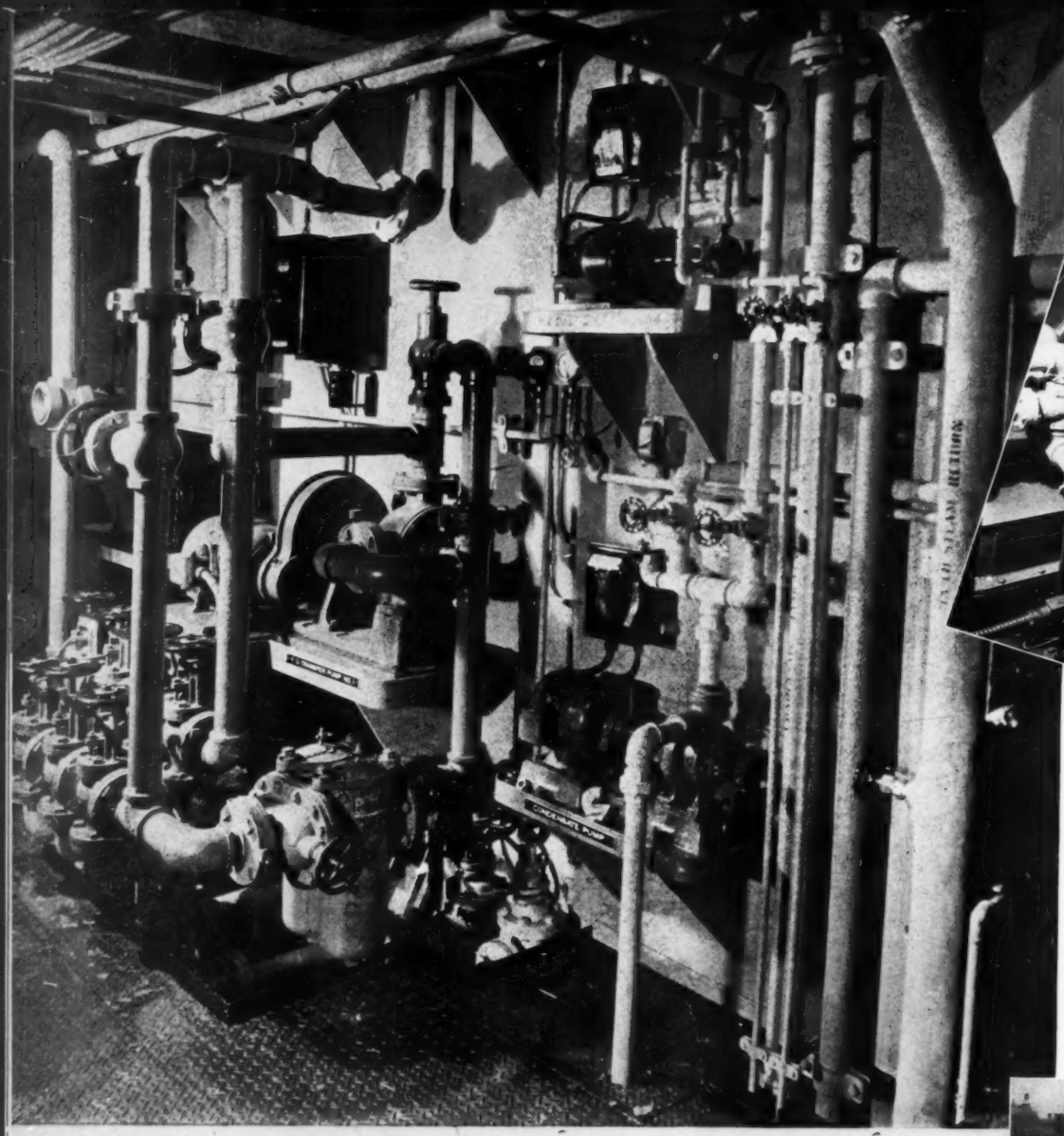
In July, 1943, R.T.C. completed delivery of the last of five twin screw tankers to the Navy. These 235 ft. vessels were each powered with a pair of 5-cylinder Fairbanks-Morse Marine Diesels and had a capacity of 135,000, 42 gal. bbls. At present this yard is on a building program of a larger number of Y.O. class Navy tankers—174 ft. vessels of 6500 bbls. capacity, powered with single, 500 hp. F-M Diesel engines.

In three and three quarter years, R.T.C. has built some twenty-two vessels – starting from scratch and has an Army-Navy "E" with two

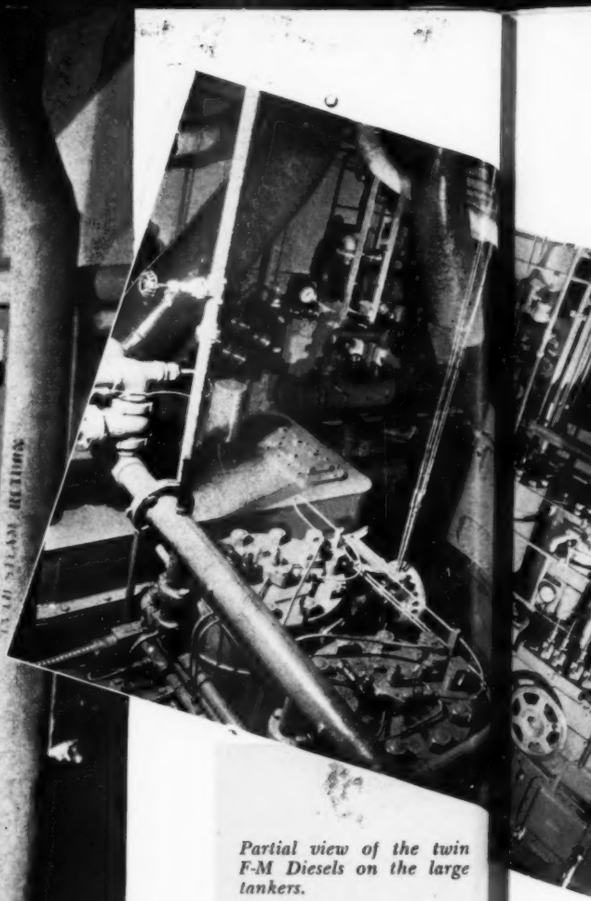
View looking forward from the bridge.



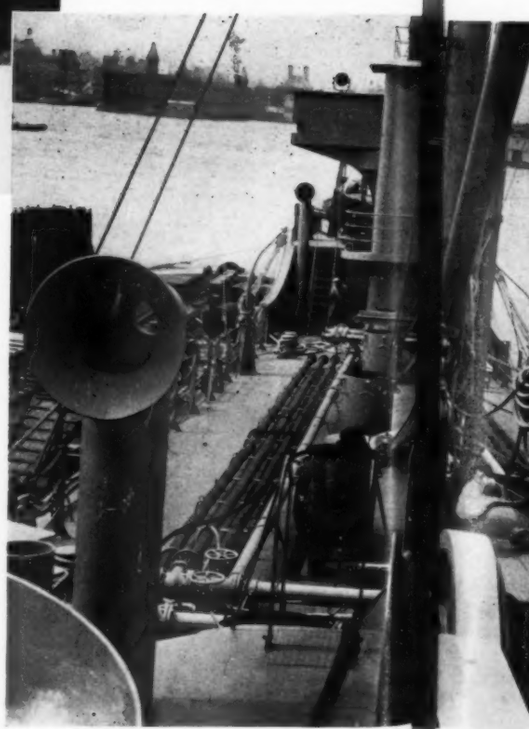
Pilot houses on both types of tankers are similar; this view typical.



View showing arrangement of circulating water, fuel and lube systems.



Partial view of the twin F-M Diesels on the large tankers.



...ng looking a...

stars for sustained excellence in production of vital craft. It is not a big yard as they go but its record of speed and quality ranks with best. Its arrangement is carefully worked out to express the best of the experience of the three principals and it is equipped with the most modern of speed tools.

Loft house and machine shop are housed in the same building on the second and first floors, respectively. Alongside is an outfitting slip proportioned to accommodate two tankers. Outfitting at R.T.C. is, however, held to a minimum since this yard launches its vessels 75 to 80 per cent completed. The ways are elevated concrete and steel structures with storage space underneath for finished small parts, valves, fittings and pipe.

A feature of R.T.C.-built ships that meets the eye is the unusual smoothness of the hulls. Carefully planned "sequence" welding is given as the reason—a procedure that relieves strains resulting from expansion and contraction of the plates and thus eliminates waviness.

The splendid ships turned out by this yard are expressions of the spirit of cooperation and mutual respect existing between the working force and the company heads. A V-mail letter recently written to Mr. Robinson by a Navy officer aboard one of the twin screw tankers in overseas service tells the story. A portion of this letter is quoted following: "Just a few thoughts to tell you and your splendid assistants how nicely everything has been going. We have three months heavy operation behind us with-

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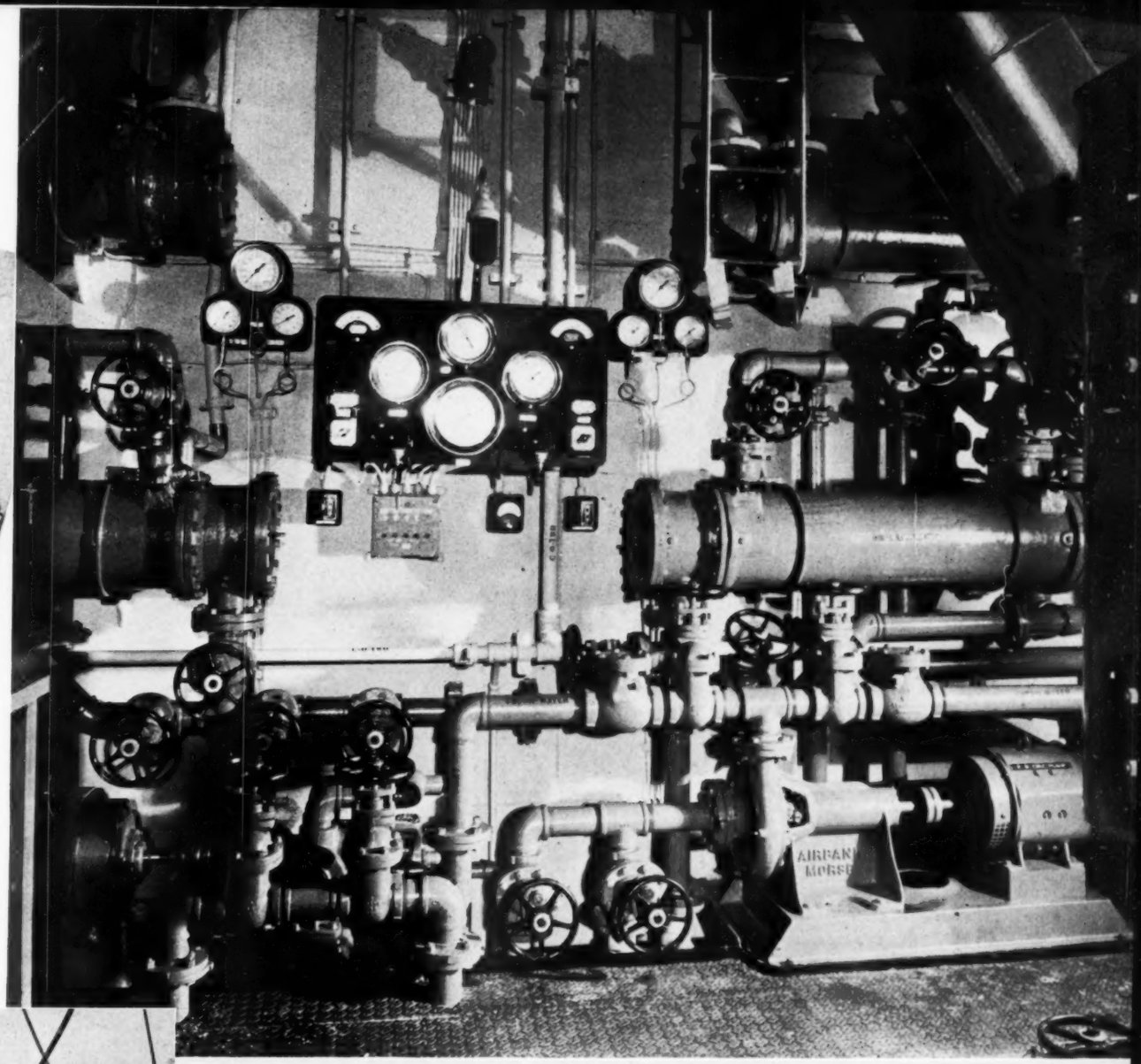
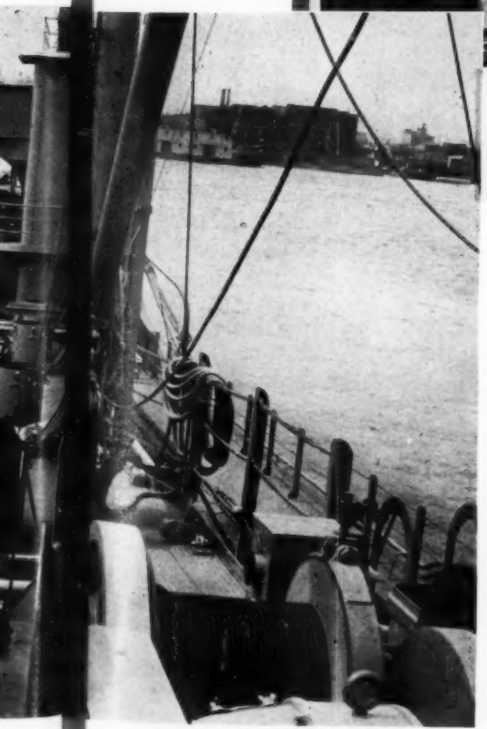
e large



Grouping of gauges, instruments and heat exchangers on the twin screw tankers.



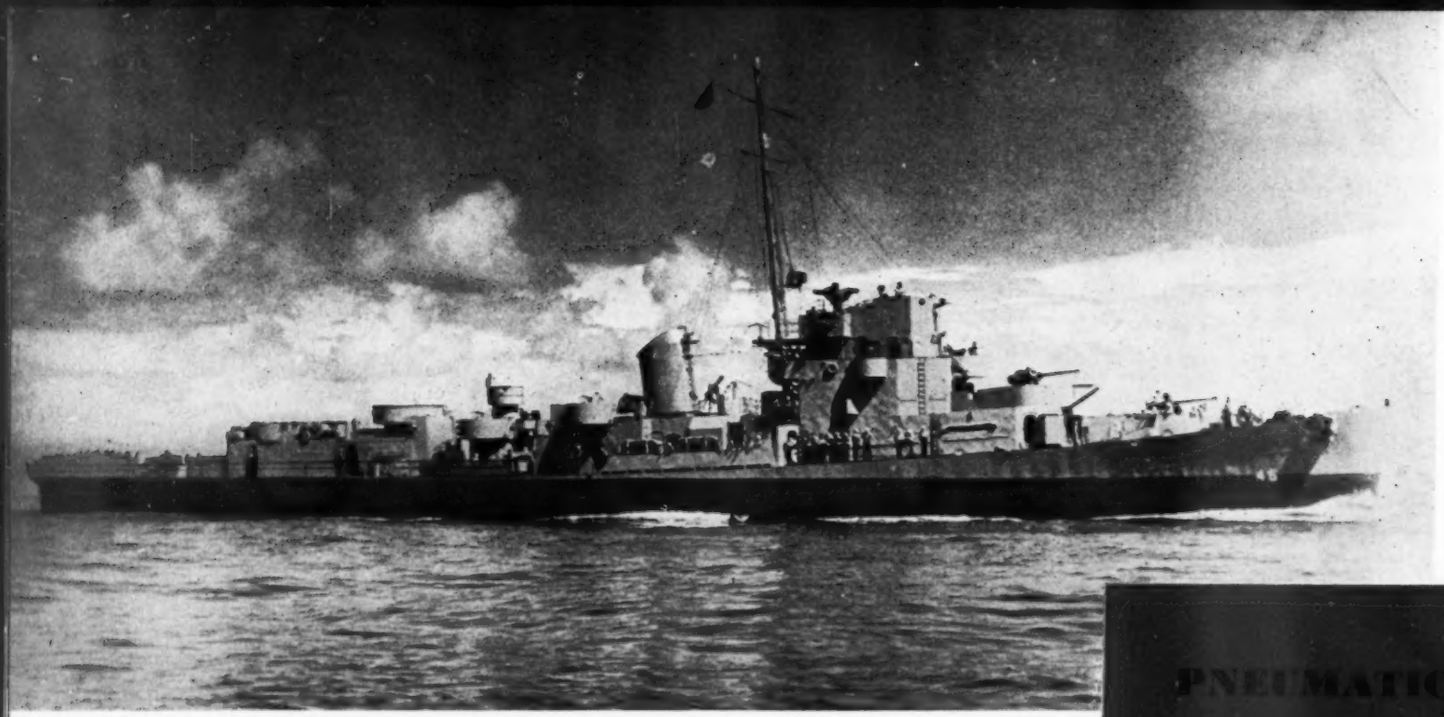
looking aft from the forepeak of the small tanker.

out a single complaint. No trouble or breakdown of any kind. Your men surely did a good job. We have seen others of your handiwork who report the same performance. Thought you'd like to know. The other officers aboard join me in wishing you and your whole force many more successful years of good fellowship and good health. Wish us luck, we're over here punching and hoping."

The twin screw tankers built by R.T.C. are powered with twin Fairbanks, Morse Diesels, 14 in. x 17 in., direct reversible, each rated 575 hp. at 300 rpm. Main engine accessories are Maxim spark arrester exhaust silencers and air intake silencers. Lube oil strainers and coolers also jacket water heat exchangers are Schutte-Koerting. The engines are fitted with Electric tachometers. Auxiliary equipment consists of F-M standby oil pump, fresh water pump, standby salt water pump, fuel oil transfer pumps, fresh water and sanitary systems and a Gardner Denver standby air compressor driven by a F-M 15 hp. motor.

The auxiliary generating unit is powered by a Fairbanks, Morse Diesel and generator of 60 kw. capacity, the engine exhaust being fitted with a Maxim spark arrester silencer.

The vessels in both these groups of tankers are comparatively small, shallow draft tankers, especially designed for services for which large tankers are impractical, and particularly for service in waters which are inaccessible to vessels of greater draft.



"Slugger of the Anti-Sub Fleet"—a modern PC destroyer escort vessel.

PNEUMATICS ON THE SEA

EIGHT million tons of shipping built in 1942! Twelve million tons in 1943! War on all seas and shores of the world. Thousands of tons of supplies must leave our shores every day and must be safely transported over the oceans to supply our armies and aid our allies. In addition, a great number of auxiliary craft is required. Stupendous achievements have been made. To the Army, Navy, and Coast Guard is intrusted the safe passage of convoys and accompanying services through seas darkened by the shadow of the U-boat and skies filled with the ever present possibility of bomber attack.

With the additional burden of protecting cargo vessels and troop transports in world wide waters, our naval program required marshalling of every available means of producing tonnage. But, a hull is not a credit on the roster unless it has sufficient power and machinery to drive it through the water. Even with wartime additions to marine engine manufacturing plants, the requirements for large horsepower units greatly exceeded the productive capacity. At the same time, there existed considerable capacity among the builders of small and medium sized Diesel engines and to make these available it was decided to utilize several of these smaller power units in place of a single large one. Again, the mobility and speed of modern war made itself evident in the naval field and the two ocean fleet had to be equipped with fast and highly maneuverable ships. All of these factors funneled into the prime requisite: flexibility, simplicity and preciseness of control.

The pioneering and developing of air brake systems to meet the complex and exacting requirements of high speed, mass land transport gave a background well suited to the problems of marine controls. The precision of operation is illustrated in the present day 150-car freight trains in which braking action is reliably transmitted at 950 feet per second (approximately 650 M.P.H.) by purely pneumatic means through the medium of 150 valve devices. The use of the same fundamental braking devices on each vehicle in any length train in any type of service, coupled with ease of control in ordinary service or emergency braking emphasizes flexibility. The modern Diesel locomotive may require four or more individual Diesel units. Throttle control on Diesel switching locomotives and main line super-speed streamliners further shows the degree of preciseness with which increments of control can be obtained and harmonized.

With all these pneumatic systems, widespread experience with sequential operation, safety interlocking, and functional reliability proved pneumatic controls well suited to handle the problems of marine control.

Pneumatic control lends itself especially to remote control-station operation because numerous control functions can be incorporated in a single small size operator's stand for any number of engines while the actual mechanical functions on the engines or other devices are accomplished by air cylinders, diaphragm chambers, interlocks, etc. This method of control eliminates complicated systems of levers and chains in mechanical arrangements, and substitutes small handles easy to operate on a control stand, greatly simplifying the operation and making a higher degree of maneuverability possible. Maneuverability may be further improved by placing the controls in the Pilot House or on the navigation bridge. The Engine Room may be supplied with a duplicate control stand by which control can be assumed there, if desired.

Considering the control problem, we find two general types of marine Diesel engines: Direct reversing and non-reversing. On both types, control of speed is essentially the same; that is, the setting of the governor is varied to obtain speed changes. Changes of direction on non-reversing engines is accomplished by means of a two directional clutch, by electric drive, or by reversing propellers. On reversing engines different functions have to be performed because the cam shaft of the engine must be shifted. In addition, starting, stopping, and operating speed control are sometimes combined on the same shaft, so that an integrated

*Westinghouse Air Brake Company

control is required, possessing the quality of accuracy, power, simplicity, and reliability.

Multiple engines are often coupled to drive a single propeller. The limitation on the number of engines that may deliver power to a given shaft is imposed by the machinery itself rather than by the pneumatic control system. As may be seen, close synchronization of engine speeds is a necessity in order to gain maximum plant efficiency and to assure equal division of the load.

As an example, consider two engines connected to a shaft by hydraulic clutches and a reduction gear. Engine speeds can be controlled at the control stand by a master handle. One of the engines controls has an additional "Vernier" adjustment feature which provides for a small increase or decrease of its governor setting so that both engines may be run at the same load regardless of nominal variations in either engine.

In such an installation, either engine may be cut out if necessary by disengaging its clutch through small control valves on the control stand. Reduction gear oil pressure may be interlocked with the clutches and the brake on the propeller shaft so that loss of oil pressure automatically disengages the clutches and applies the shaft brake, thus preventing damage to the reduction gears. Signals interlocked with control functions give the operator and navigator warning of abnormal or dangerous conditions. Thus the engine room personnel are relieved of such manual and supervisory work, permitting more attention to details of machinery operation. On the bridge, the navigator and captain are instantly advised of engine room conditions and can alter plans accordingly.

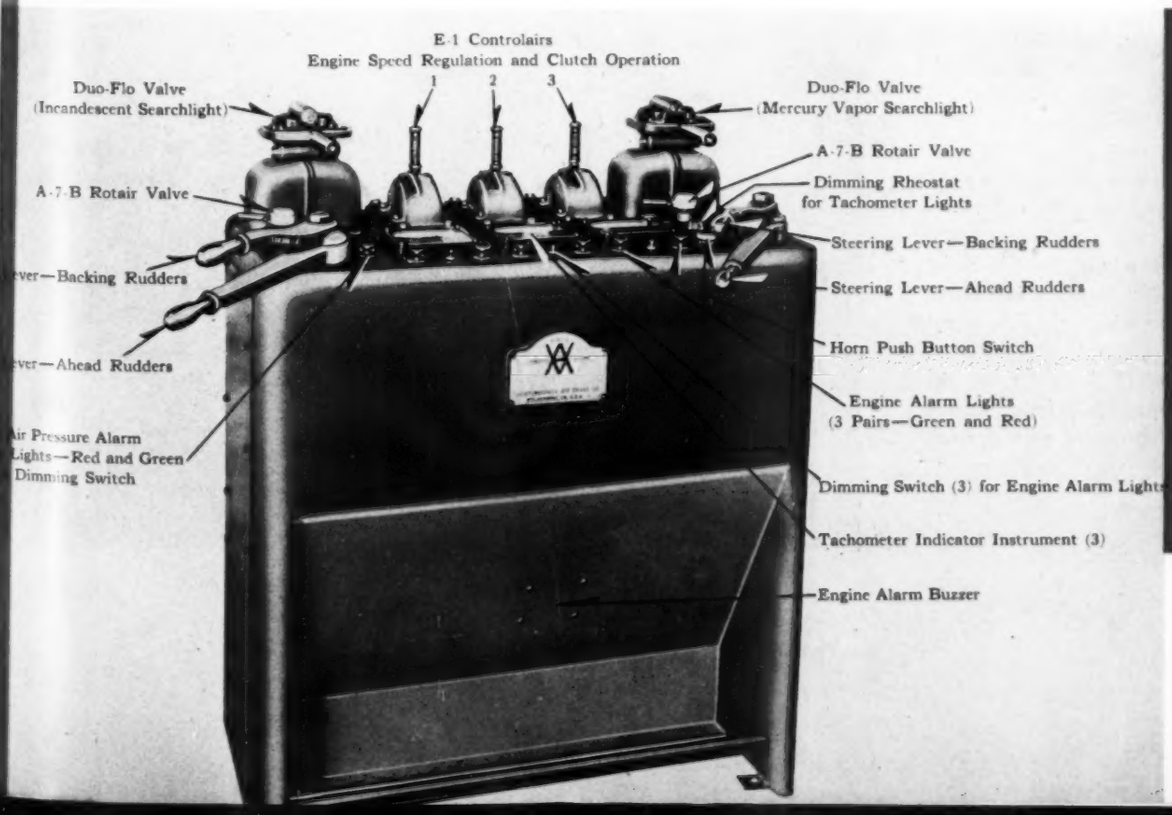
On smaller vessels, such as coastal, river and harbor craft, the control station is generally placed in the pilot house with additional controls for auxiliary apparatus added on the control stand. Safety of operation in restricted channels and uncharted waters is increased by having primary control of steering, propulsion, and navigation aids at the hands of the pilot. Thus the pilot or helmsman, upon seeing a dangerous condition, can immediately take action to avoid trouble without having to relay his orders to the engine room and wait some necessary time before execution takes place. For instance, in case of a shallow draft Diesel vessel, with three engines, for maintenance service in restricted waters, the Diesels, being of the non-reversing type, are connected to the propellers through two-directional clutches which are shifted pneumatically.

Clutch and speed control handles are located on the control stand in the pilot house with a duplicate set of controls in the engine room for use if desired. Audible and visual indicators are also used on the pilot house stand to give warning of abnormal or dangerous engine room conditions. With such a background, the operator in the pilot house has the control of his ship at his "finger tip" and can maneuver it to his immediate will.

The steering problem has been simplified by applying pneumatic devices to control the steering functions. The steering valve (or valves, in case of more than one set of rudders) can be set by the touch of a hand to any rudder degree, and this setting will be accurately maintained until the pilot again moves the handle. Other steering stations may be placed outboard at the bridge. This is advantageous for docking and operations in close quarters because it gives the pilot direct control of steering at a place where he can watch his clearances.

Pneumatic control for searchlights is incorporated in the control stand. By means of a single handle any size light may be traversed, elevated, or depressed from the bridge, or pilot house. This permits locating the searchlights in the most advantageous positions for light projection. It further eliminates the necessity of a man standing behind a light, and of most importance provides the best vision for the operator in the pilot house.

The examples outlined above are only indicative of what is being done to provide pneumatic control systems in present marine service. The pneumatic system has provided a precision of control. It has provided also a means of combining many difficult duties into a simplified centralized control station. Broadly, the use of pneumatic systems has made it possible to accomplish objectives that have never been attained before. From this heritage of time tested principles, it is evident that the pneumatic system is qualified to "go to sea."



Central marine control stand incorporating concentrated controls for essential ship services.

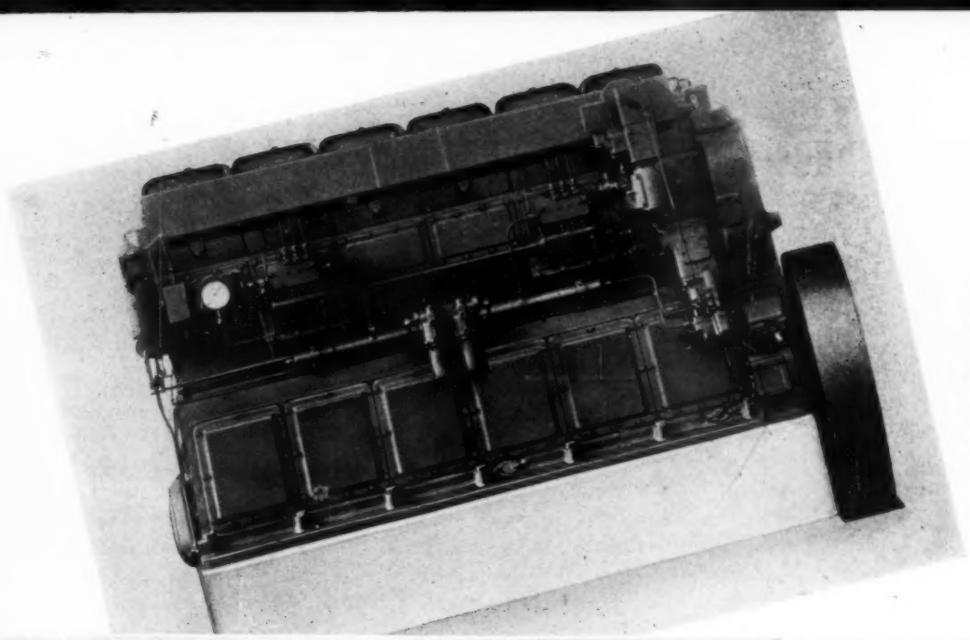
A DIESEL DRAGLINE THAT WALKS

By WILL H. FULLERTON

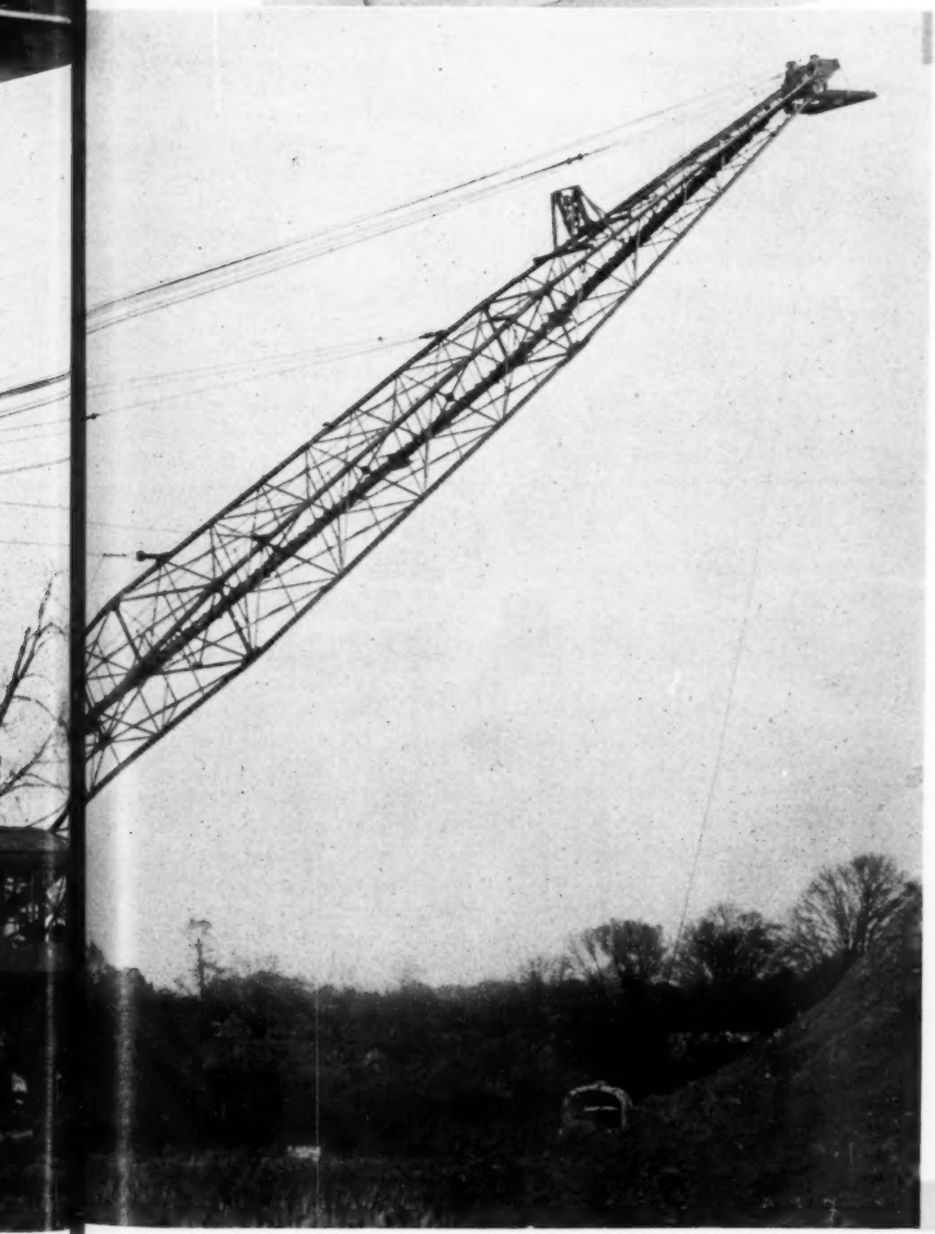
ONE of the largest dragline units ever constructed was recently placed in service stripping top soil, at the rate of 1000 tons a day, off a coal deposit preparatory to surface mining near Grove City, Pennsylvania. This 350-ton walking dragline, which derives all of its power from a relatively small Cooper-Bessemer Diesel, rated 375 to 420 hp. at 500 rpm., is a Bucyrus-Monahan product and is the property of The Buckeye Coal Company. Its ability to "walk" over rough, wooded terrain, plus the economy and availability of its Diesel prime mover render this equipment especially advantageous for this type of service.

Instead of moving about on conventional wheels or tracks, for example, the big digging unit actually "walks" on two giant pontoon-type feet, 27 feet long and 5 feet wide. Power from the relatively small main power unit, a Cooper-Bessemer Diesel engine, is transmitted through large eccentric cams located on each side of the cab. With the "feet" resting on the ground, the entire structure, including the 160-foot boom, is lifted up and moves forward and down, the 26-foot diameter circular base finally locating 7 feet ahead of its previous position. In order to overcome the suction created between the flat base and the earth, the weight is distributed so that the front of the base is elevated first, then, upon reaching maximum height, the rear raises up and forward.

Continuous repetition of the action just described permits the machine to travel through wooded terrain, over streams and up fairly steep



Extreme left: Looking up the giant boom with side catwalk. Left: This 375 hp. Cooper-Bessemer Diesel develops ample power for operation and locomotion of the big 350-ton walking dragline. Below: General view of the dragline in operation; note side mechanism and shoes on which the machine actually walks.



grades at a rate of two steps per minute, or approximately one-sixth mile per hour.

In addition to the power supplied through direct connected drive, the Diesel also generates electrical energy for two vertical 40-horsepower electric motors which operate the boom, and furnishes current for the lighting system used during night duty.

With a capacity for up to 1000 tons per day, the dragline fills its six-cubic-yard bucket, then hoists, swings and deposits its load, repeating the operations at a surprisingly rapid rate.

Owners of the equipment, The Buckeye Coal Co., subsidiary of The Youngstown Sheet and Tube Co., first used the unit to excavate a huge drainage ditch near the site of its present coal-stripping operations in the vicinity of Grove City, Pa.

Although the machine can dig to a depth of 55 feet, mining officials estimate that the coal strata in this region does not exceed 42 feet, a depth considered inefficient for deep-mining operations.

The entire production of coal stripped by this giant Diesel engined dragline is being used for direct war production purposes in the owner's Youngstown, Ohio, steel mills. Despite the size, weight and tremendous capacity of the big stripper, only a two-man crew, (control operator and oiler), is necessary to handle the entire machine.

FUTURE FOR DIESEL ENGINE FUELS

ABSTRACT of paper on "Future for Diesel Engine Fuels," by Arch L. Foster, Refinery Editor. *The Oil and Gas Journal*, Tulsa, Oklahoma, at the annual meeting of the American Society of Mechanical Engineers at the Hotel Pennsylvania, New York, Thursday, December 2, 1943.

"Thermal cracking processes for gasoline making will compete with Diesel fuel outlets for premium gas oils and middle distillate oils," said Mr. Foster. "Diesel-engine designers should plan to utilize lower cetane number fuels to serve the Diesel advantage of better economy, since recycle catalytic charge stocks of this character may be most readily available at competitive prices.

"For two decades, more or less, the fuels required by high-speed Diesel engines have been in competition between that use and the potentially more insistent use as charge stock for gasoline-producing cracking processes. The result has not always been determined on the basis of economics alone, but it is believed that in the future, the economics of hydrocarbon fuels supply will rule distribution and application somewhat more closely. That may be only wishful thinking.

"The war-time economics of Diesel and motor fuels is at present practically determined—the requirements for war are being, and will be met as the situation demands and as manufacturing facilities, new or old, make possible. Under the conditions this is the only manner in which these problems can be met and solved; war demands must be supplied, including both the needs for the actual armed forces and for the industrial army behind the gun-fighting front.

Non-essential demands may be supplied as far as possible from any surpluses left after primary needs are satisfied. That situation is before us now, and all of us know, in general the present situation regarding supplies of suitable Diesel fuels for the duration. Those supplies are inherently more difficult to obtain for non-essential uses; their qualities are less uniform and may wander farther from strict specifications than is the case during peace times.

"We believe the postwar future of the Diesel engine is of far greater importance in our deliberations and thinking than is any situation which involves only the immediate future during the necessarily abnormal period of the war. Essential Diesel engine operations will be supplied with reasonably satisfactory amounts, simply because it is necessary to proper and successful prosecution of the war, and variations from this wartime norm will be due to the difficulties of transport, supply and the foreseeing of supply requirements under wartime conditions. Barring the possibility of a totalitarian state—in one guise or another—in the postwar period in these United States, good economics, i.e., the Law of Supply and Demand may be expected to take over its normal function interrupted inevitably by the War. This paper includes details on this expected situation insofar as they seem pertinent, reasonably dependable, and are not submerged by censorship.

"The consumption of premium quality distillate fuels of the properties of kerosene and heavier, from which fractions Diesel fuels are drawn, will be determined over any considerable period of time by comparative prices. Under any normal conditions of private enterprise conceivable these premium quality fuels are worth more as Diesel fuels, compared to fuels of lower ignition quality, than as furnace oils, etc. Consequently, the Diesel operator can purchase these fuels under favorable economic conditions. Fuels of lower Diesel-ignition qualities are in most cases quite as satisfactory as furnace oils, as are those high cetane-number fuels, since detonation, preignition, etc., are not important in heating furnace operation. Therefore, in any contest for the better quality distillate oils the application from which the greatest return may be obtained is the one which can economically use these fuels at the highest price, and which thus can obtain and use them. So, for the purpose of this paper, we are considering the situation between distillates of good Diesel fuel qualities and also of good furnace oil qualities 'no contest.' The Diesel engine will have the call on these fuels in any 'natural' economy. In this paper, also, we refer to the high-speed, automotive type Diesel and its fuels.

"Viewed through the roseate glasses of the spark-ignition motor fuel manufacturer—the refiner—the world situation is changed radically. Generally speaking it is axiomatic that the bes Diesel engine distillate fuels are among the bes charge stocks for the thermal cracking unit fo high-octane-number gasoline production. Als the 'recycle' oil — partially but insufficient cracked oil which has passed one or more time through the cracking still—from these therma units has deteriorated in Diesel fuel qualities especially in cetane number. Therefore, so fa as thermal cracking for motor fuel is involved competition for these stocks for the two pur poses is direct and the utilization of them wil be determined on practical economic principle

"As present-day refineries are now operated these distillate fuels are suitable without an treating, or at worst with a minimum of inex pensive treatment, for immediate consumption as Diesel engine fuels. The more paraffinic th virgin distillate is, the more premium its quali ties for Diesel fuel, in the general conception

However, some highly paraffinic, high cetane number 'gas oils' yield relatively low octane number motor fuels (gasoline) and become be ter charge stock for a re-cracking operation particularly as to the octane number of th product made by cracking the heavy oil a second time. However, much of our motor fuel ha been and will be produced from paraffinic o mixed-base gas oils, from the necessity of avai able supply.

"The obligation on the Diesel engine designe to so build his engine that the cheaper grade of fuel may be used with advantage, has no lessened; in fact that obligation, if it obtain at all, has increased during this war and wil so continue afterward. One of the two or thre main advantages of the Diesel engine is econ omy of operation, of power generation, of fue cost. If that advantage is lost by building fo premium price fuels, it is doubtful if in th users' minds the mechanical efficiency gained b high cetane fuels will offset the extra cost o these premium fuels.

"It is desirable that the Diesel engine make advance their prospects by investigating th limits and values of the use of additives to im prove ignition quality of their fuels. Numerou chemical products are known and used in some degree which do this effectively."

BENJAMIN FRANKLIN AND ELECTRICITY

Editor's Note: In honor of Benjamin Franklin's 238th Birthday—January 18th, 1706—we are pleased to publish the following highlights on his early investigations in the realm of electricity, supplied by The National Franklin Committee.

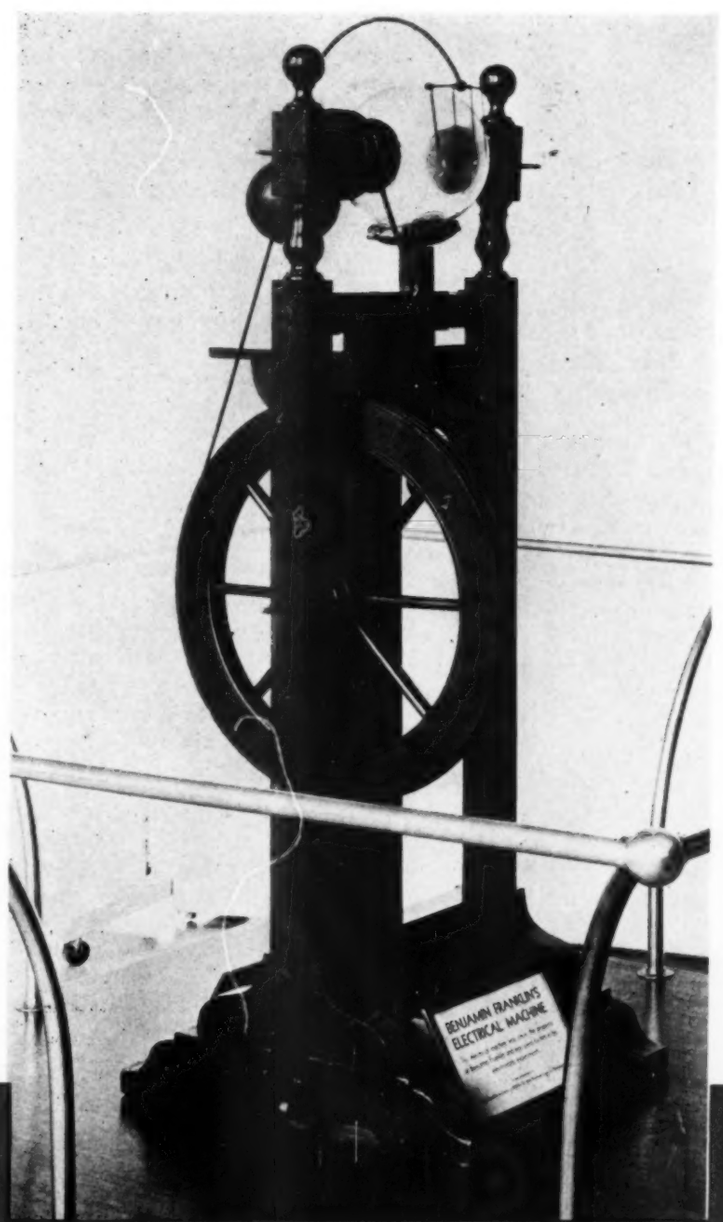
KANT once remarked that Benjamin Franklin was a new Prometheus who had stolen fire from heaven. In his own day, Franklin was celebrated throughout all Europe as the world's foremost electrician and his book on the subject was in demand in many countries. Far-reaching in its influence, the book became an important text in the electrical field and even today we still write of electricity in terms introduced in print by Franklin. Used in the electrical sense, probably for the first time, in the inventor's book were words such as armature, battery brush, charged, charging, condense, conductor, discharge, electrical fire, electrical shock, electrician, electrified, electrify, Leyden bottle, minus, negative, non-conducting, non-conductor, non-electric, plus, positive and others.

The book, entitled *Experiments and Observations on Electricity*, was published in several editions and was read and admired in all parts of Europe. The author presented his findings for both the layman and the specialist and tried to remove all mystery and obscurity from the subject of electricity. The book was composed of letters and papers extending over a period of twenty years, during which time Franklin added conclusions and footnotes to his writings to change original theories and explain why he had at first been misled. For instance, in an early edition of his book he thought that lightning followed the shortest path and melted metals by "cold fusions," while he later mentioned that lightning followed the path of "least resistance," and melted metals in the normal way by heating them to their melting points. Later conclusions as contrasted with the earlier ideas of the author have furnished the reader with a valuable document, for he not only encounters Franklin's descriptions of his experimental and theoretical discoveries but gains an idea of the history of the development. Speaking of the footnoted additions Franklin said, "In going on with these experiments, how many pretty systems do we build, which we soon find ourselves obliged to destroy! If there is no other use discovered of electricity, this, however, is something considerable, that it may help to make a vain man humble." —(letter to Collinson, August 14, 1747).

In the preface of the first edition of his book he stated, "It has, indeed, been of late the fashion to ascribe every grand or unusual operation of nature, such as lightning and earth quakes, to electricity; not, as one would imagine from the manner of reasoning on these occasions, that the authors of these schemes have discovered any connection betwixt the cause and effect, or saw in what manner they were related; but, as it would seem, merely because they were unacquainted with any other agent, of which it could not positively be said that the connection was impossible. But of these, and many other interesting circumstances, the reader will be more satisfactorily informed in the following letters, to which he is therefore referred by the editor."

Franklin proceeded in the letters to explain

. . . . *And now please turn to page 78* . . . .



Franklin's electrical machine at The Franklin Institute in Philadelphia. The machine is now in storage for the duration.

"Meeting the Problem of Increased Load Demand with Present Equipment"

Conducted by R. L. GREGORY*

MANY problems, foreign to peacetime operation, have been thrown into the laps of power plant supervisors and operating personnel, since the adoption of our all out war production program. Possibly the greatest problem of all, has been that of keeping apace with the load demands created by this program. This has been particularly true of municipal and privately owned plants in the smaller industrial centers, and the problem has become serious due to two causes.

First; many small industrial communities, which in peacetime enjoyed a healthy industrial activity in plants which depended solely on the local power plant for power and light, have had an overnight mushroom growth of their industries. This growth has necessitated much additional equipment, requiring additional power and light.

Secondly; this additional power and light in most instances has resulted in an increased load demand upon the local plant, which has not had the capacity available to meet this demand, and which, due to the diversion of materials ordinarily used in the manufacture of generating equipment to more vital war needs, has been unable to procure further generating equipment.

The problem has then arisen as to how to take care of this increased load demand with present equipment. There are many angles from which such a problem may be approached. First is your equipment performing at a peak of efficiency? Let us just take a few examples and ask a few questions to ascertain what may be done to arrive at a logical answer.

How many KWH are you getting per gallon of oil from your units? If you are keeping a daily record of plant operation you should be in a position to answer this question immediately. If you are not procuring the number of KWH that your unit is capable of delivering, where is the trouble? Is it in the mechanical condition of your unit, such as worn rings and liners allowing blowby, is it in your fuel equipment, is it the fuel, lubricant or what is causing the trouble?

We all know that the fuel situation today is not what it was prior to our lend lease program. Fuels for the most part contain more impurities, abrasive materials, etc., which react upon the mechanical condition of the units, causing increased maintenance and inspections. Such a condition warrants the expenditure of money in equipment to eliminate these foreign substances getting into your units. The same holds true with the lubricant situation. Lubricants are not what they were a few years ago and more care must be taken and closer observance paid to the matter of lubrication.

In discussing the subject of lubricants with a well informed engineer some time ago he said to me: "Anytime you receive information from a company supplying lubrications, stating, that there has been a slight change in the grades of certain oils, you may take it for granted that that change is not an improvement, and if you are a user of that oil, it is merely a warning to keep close observation of that lubricant. This is necessitated by the inability of oil vendors to obtain materials formerly blended in the lubricants. When any improvement is made in a lubricant, it is advertised from one end of the land to the other, and hailed as a great achievement," and, to the writer that seems a logical conclusion.

Then again appears the problem of proper cooling of your units. Perhaps you are hampered in getting the full efficiency out of your units due to undersized heat exchangers, or due to scale and rust in the cooling system. This was brought to the writer's attention a short time ago in a letter received from an engineer who stated that he could not carry the rated load on his units and investigation showed that his cooling system was becoming clogged with deposits of lime and scale to such an extent that he could not keep his oil temperatures within reasonable operating conditions.

Then there are conditions outside of the plan which reflect directly back upon the plan One of these is the distribution system. Whe ever you encounter economic conditions suc as we have today, and the mushroom growt of many plants, you are bound to run int problems of power factor and line losses. Ma chines must be operated and when the suit able sized motors for such operation are no available, industries are forced to use wha they can obtain. This often results in ove sized motors being installed on machines, line becoming overloaded, voltage drops which i turn makes a first class saboteur out of th power factor on your system.

Most generating units today are rated upo a power factor of 80 percent. If these uni are operating on a system power factor of 6 or 70 percent, the plant suffers and you ar unable to get the proper efficiency from you equipment. If, on the other hand, you ca maintain a system power factor of 90 percen your units will handle their rated loads an then some with apparent ease. It pays t make a survey of the power factor situatio in plants which you supply with power.

Here again a few dollars spent in capacitor synchronous motors, on larger drives, etc., n only saves your customer money, but enabl you to carry loads more efficiently and keep more uniform voltage eliminating motor an control troubles, and shut downs due to burn outs, etc.

Again there is the problem of obsolete equip ment. While we are all aware of the di ficulties encountered in obtaining new ma rials, we are also aware of the foolhardine of operating worn out and obsolete equipmen Worn out parts of a unit should be replace You may not be able to do it today, tomorro or next week, but with a little foresight o your part and accompanied by a little per verance you may be able to procure replac ment parts in a few weeks or even month This beats going on indefinitely with the o worn out equipment, and the ever increasi cost of repairs and drop in efficiency.

* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*

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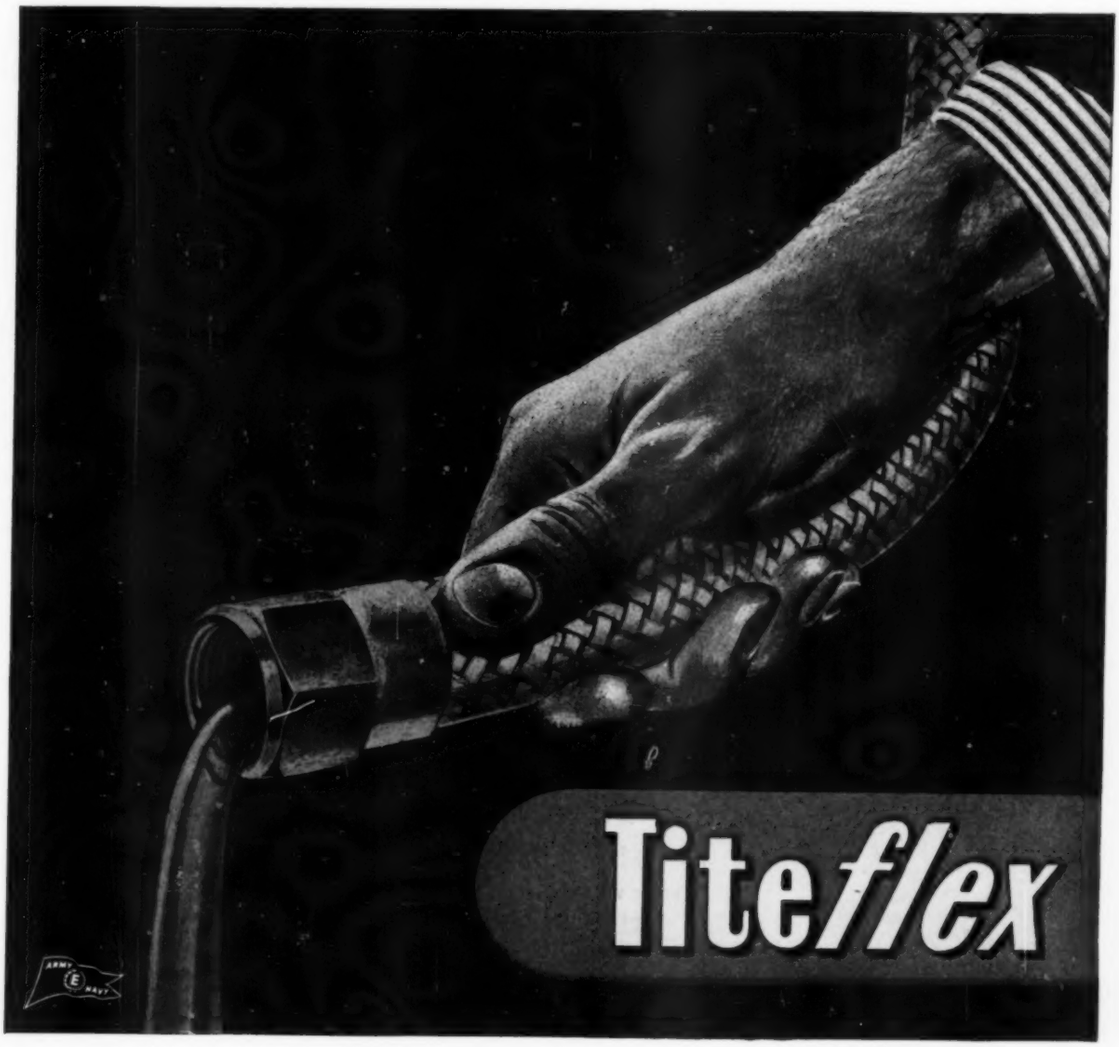


Exchange Your Diesel Maintenance Ideas

Conducted by R. L. GREGORY

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Gregory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

"Leaky Cylinder Liners and Broken Gaskets"

IN the November issue of DIESEL PROGRESS, under the heading of "Taking the Hit out of Hitler" the writer discussed a temporary repair on a leak caused by a broken gasket between the liner and block. Some very informative letters and interesting questions on this subject have been received since the November issue and since this is the material which we like to receive we are publishing the following letter from Supt. J. H. Russell of the City of Rochelle, Illinois.

"In reference to your article in the recent issue of DIESEL PROGRESS in the Supervising and Operating Engineers Section, in which you describe a unique method of temporary stoppage of a leak in a cylinder liner which had a supposedly broken gasket.

"The method you used in stopping this leak, even if only temporary, is interesting. Inasmuch as we have experienced four leaks, such as you describe, on one of our engines there might come a time during an emergency when this information might be used and be of value to us. In looking at your sketch in Figures 1 and 3, if you have followed the outline and shape of the broken cylinder liner and cylinder in making this sketch, I would say that this is the same make of unit on which we have had four liners break and cause leaks such as you describe.

"At the time we had these liners fail, our plant was in a very critical condition, in view of the fact that one of our engines was out of service with a broken crankshaft. Load conditions at the plant at the time these liners failed, permitted us to take the engine out of service for repairs, whereas at a later period load conditions known to us in advance would not have permitted us to take the engine out of service for repairs. Therefore we could and did secure the new liners and replaced the broken ones. With the method you describe, had it been known to us, I believe we could have used the same with safety and secured several more months of service from the cracked liners, which at the time did not have much wear.

"As you state in your article, this breakage occurred over a year ago, and no doubt permanent repairs have already been completed. If they have, I would like to know if the leak was caused by failure of the gasket or was the liner cracked? If the job hasn't been completed, I would like to offer as a suggestion—information gained from experience, that might save time and money.

"First, as a precautionary measure I would suggest that you secure a new liner and have it on hand when you start the job. Second if the caulking job does not permit the liner to leak water I would not disturb same until such time as it does give trouble. From my experience I think that when you pull this liner you will find that you not only have a broken gasket but that you also have a cracked liner, and for this reason you should have a new liner on hand to replace same. Pulling a liner on a large engine is no small job and you would not want to put the old broken liner back in the engine and wait the arrival of a new one, which was what happened to us.

"I am enclosing a sketch showing the nature of the crack we experienced on our engine, and would appreciate it if you can inform me of the facts as you have found them."

Since it is impossible for the writer to personally answer all inquiries of this nature, I want to give Mr. Russell the facts as they were found on the unit discussed, now that repairs have been completed, since we of the fraternity are all interested in any tricks or kinks which may help us out in an emergency.

There were two liners leaking on this unit and the repairs as mentioned in the November article were identical on both liners. It must be kept in mind by both Mr. Russell and all of our readers, that such repairs are not considered as cureails, but merely as a means of keeping things moving until such time as permanent repairs can be made. On one of the cylinders in question we had a combination of both a small crack in the liner, about two inches long, similar to the one shown in Mr. Russell's sketch and a broken gasket. On the other liner there was no cracked liner, merely a broken gasket. On the first liner, our caulking held for several weeks, but ultimately began to leak which necessitated recaulking. This was probably due to the fact that the head was removed and in replacing it perhaps a little more pressure was placed on the nuts than formerly which aggravated the crack slightly. On the second liner we have had no trouble since caulking it, although at the start this gasket leaked as badly as the first one. The head has also been off this cylinder several times, but the caulking has probably held due to the fact that there was no crack in this liner.

This unit has been in operation several years and would have operated several more I believe as far as the leaks were concerned. The cause of changing liners was due to the fact of natural wear, which decreased the efficiency of the unit and not due primarily to the leaks which were under control. However the writer would not recommend operating a unit indefinitely with such a temporary repair, but with present conditions as they are in the procurement of repairs, ofttimes we are forced to take steps and measures which may seem unethical in order to obtain results.

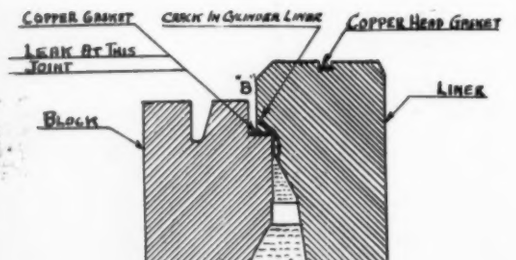


FIG. 1

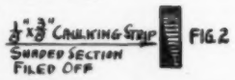


FIG. 2

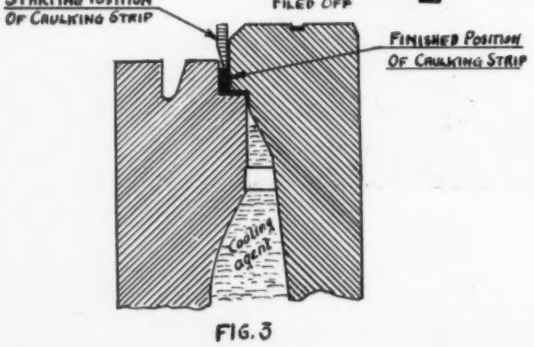


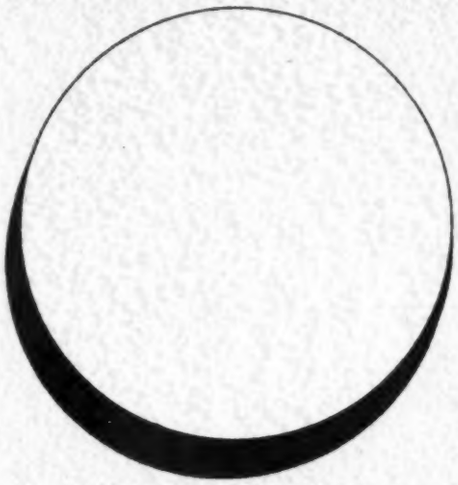
FIG. 3

"Emergency Repairs on Leaky Gaskets"

The following letter received from Mr. E. L. Simon of Dubuque, Iowa, is self explanatory:

"In the November issue of DIESEL PROGRESS, under the heading, Exchange Your Diesel Main-

. . . . *And now please turn to page 68* . . . .



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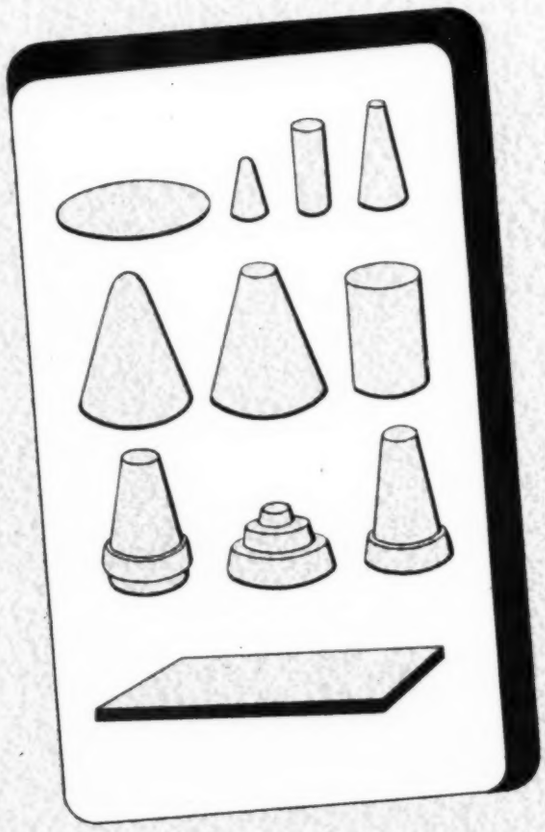

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These Diesels—Hundreds of Them—Are Now Helping To Win the War

THIS photograph, taken early in 1943 at the main plant of Gray Marine Motor Company in Detroit, shows 6-cylinder Gray Marine Diesels in process, for shipment to a total of 37 Boat Builders, and for destinations overseas.

Winslow Engineering Company Appoints New Distributors

APPOINTMENT of new distributors in seven important centers was announced last month by Winslow Engineering Company, manufacturers of Winslow oil conditioners, fuel oil filters and replacement elements. They are:

Memphis, Tenn.—Stratton-Warren Sales Co. Chattanooga — Manufacturers-Distributors Co. New Orleans—Stratton-Baldwin Co.; Salt Lake City—Peerless Oil Distributing Co.; Butte, Helena and Great Falls, Mont.—Crawley Motor Supply Co.

Emergency Repairs on Leaky Gaskets, *Continued from page 6*

tenance Ideas, I note 'Emergency repair of Leaky Gasket' as suggested by Mr. W. F. Hamacher of Grand Rapids, Michigan.

"The writer has had occasion to use this method for repairs several times in the past. There is just one suggestion I would like to add in connection with this idea and that is, for anyone using copper wire in this connection, to be sure to anneal the wire first. I mention this as most of the copper wire in its original state, which you might procure for this work, would be entirely too hard without first annealing it."

This point is well taken and copper wire used in this connection should be annealed to make it as soft and pliable as possible in order to obtain a tight joint. When such a repair is made on a cylinder head gasket, it is well to use plenty of powdered graphite on it also. If a gasket which is used in a water or oil line is repaired in this manner, a good coat of glyptol should be applied to the gasket.

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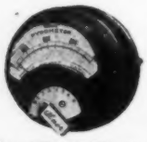

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Ross Heater Opens Detroit Office With Frederick J. Lupke in Charge

A DETROIT factory branch office has bee opened by Ross Heater & Mfg. Co., Inc., manu facturer of all types of tubular heat exchanger oil and water coolers, heaters, condensers, steam jet air ejectors, tube expanders and simila equipment. Manager of the office, located a 715 New Center Building, is Frederick J. Lupke Jr., who will devote his time exclusively to th sales-engineering of Ross equipment.

Frederick J. Lupke, Jr.

Before taking over the Detroit office, Mr. Lupk was Assistant Production Manager of the plan in Buffalo, New York. Since 1937, when h joined Ross, Mr. Lupke has served in variou capacities, including Estimating, Sales, Engi neering and Production Departments.

American Bosch Appoints Reginald J. Alden

REGINALD J. ALDEN has been appointe Manager of the Service Education and Adver tising Department activities of the America Bosch Corporation, Springfield, Mass.

In addition to supervising the Service Trainin Schools, Mr. Alden will handle sales promo tional work in connection with American Bosc fuel injection and ignition products. Previously he has been associated with the Cowdrey Pro ucts Corporation of Fitchburg, Mass., and th Bendix-Cowdrey Corporation of South Ben Indiana, where he was engaged in the develop ment and merchandising of specialized machi ery and equipment for the automotive industr

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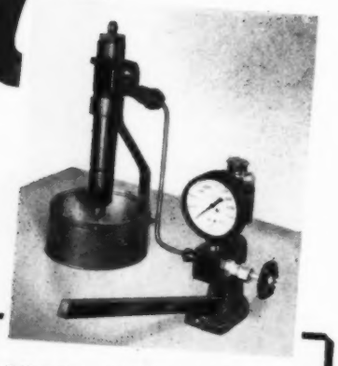

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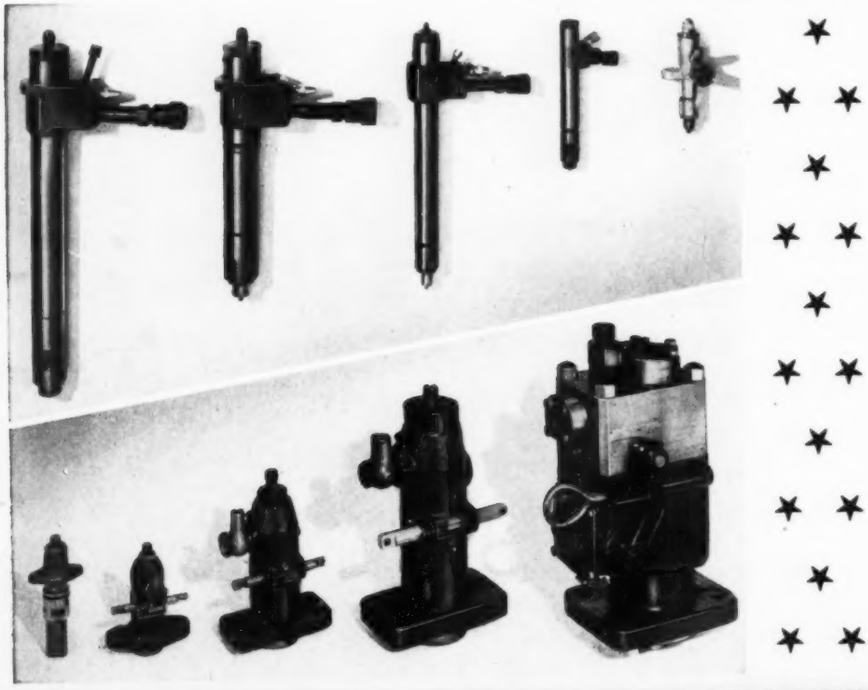

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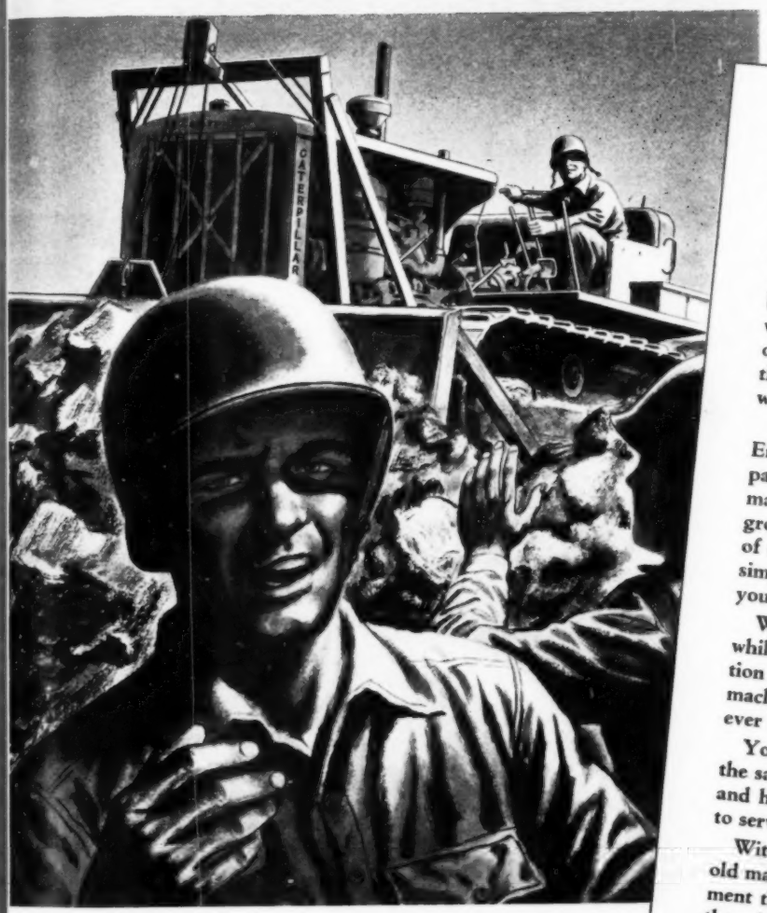
Moraine Products Division Issues "Imagineering" Bulletin Featuring Porex

A NEW bulletin, outlining the engineering fe tures of Porex, a powdered metal product f filtering all sorts of fluids, and especially fe turing "Imagineering" data covering broad fiel of application, has recently been published b Moraine Products Division. Porex is describe as a porous metal, approximately one-half voi produced by bonding together, metal to meta of small spheres. In its various grades, its pa ticle removal characteristics ranging from .0 in. down to .0005 in., Porex is said to be adap able as filtering elements for a wide variety applications including automotive power plan Diesel engines, refrigeration system, oil burner aircraft engines, pneumatic tools, fine instru ments and controls, textile and plastic machine The booklet includes complete engineering da covering the characteristics of Porex with vi cosity conversion charts, pressure drop char flow charts—page after page of them and blan data sheets for use in submitting filtration pro lems for recommendation. Write for your co of this informative Porex bulletin on you letterhead to Moraine Products Division General Motors Corpn., Dayton, Ohio.

Westinghouse Engineers Predict Gas Turbines May Have Part in Post-War Developments

ARRIVAL of the gas turbine will probably b earlier because of war-forced development high-temperature alloys, according to Westin house engineers. The gas turbine has been ju around the corner for many years, but develo ments yet incompleted in the laboratory indica that practical gas turbines may be available aft the war. Probably they will be used first i locomotives where some economy can be sac ficed for convenience. The first power-hou type gas turbines will probably be small, hig speed geared units (3000 kw. at 15,000 rpm of the open-cycle type located near load cente close to the point of utilization of electrical e ergy. Such prime movers would also be co venient for installation in small generati plants. For larger blocks of power such as r quired in the main power stations, a batte of small units may be used with the individua units started and stopped (push-button fashio to operate at peak efficiency. A second la development step may be in the direction large capacity individual gas turbine units. Th would be of the closed-cycle type complete wi heat exchangers, etc., and having efficienc approaching modern steam units. Weight a space reductions will possibly make them attr tive also for ship drives.

"CATERPILLAR" DIESELS ARE WORTH WAITING FOR!



RIGHT NOW, "Caterpillar" production is at an all-time peak — far bigger than it ever was in peacetime. But when the Armed Forces have taken the lion's share of these machines that they need so much and use so well, there are nowhere near enough left to meet the world-wide demand. The War Production Board is allocating the available balance as fairly as possible among civilians whose work is essential to the war effort. Thousands of other prospective purchasers are asked to wait for their new "Caterpillar" Diesel equipment — but it will be *worth waiting for.*

"Caterpillar" Diesel Tractors, Motor Graders, Engines and Electric Sets have been good in the past. They will be better in the future. No "dream machines," but *proved* on the toughest testing-grounds the world has ever seen — the battle fronts of this war. They'll have the same ruggedness and simplicity, the same economy and dependability you have always known and liked.

When victory comes, you won't have to wait while the factory reconverts. "Caterpillar" production lines will keep right on rolling them out, and machines will be obtainable in larger numbers than ever because of our vastly expanded output.

You'll buy your new "Caterpillar" Diesels from the same trusted dealer who knows your problems and has continued throughout these critical times to serve you well.

With his help in servicing and maintaining your old machines, you can afford to wait for the equipment that is your first choice. It will be available the minute war conditions permit.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR
REG. U.S. PAT. OFF.
DIESEL

TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!

THE FIGHTING FOUR

INSPECT Look your equipment over frequently. For expert "internal" inspection of operating parts or functions, call in a trained "Caterpillar" service man. Read your Operator's Instruction Book.

LUBRICATE Use the right oil at the right time in the right place and in the right quantity. Keep the oil clean — change before it becomes dirty and deteriorated. Follow the Operator's Instruction Book.

ADJUST Tighten all bolts. Keep fan belt and tracks at proper tension. Read the Operator's Instruction Book. For fuel injection valves and other precision adjustments, let your experienced service-dealer do the work. He'll do it well.

REPLACE Have your service-dealer replace or repair worn bearings, track rollers, pins and bushings, sprockets, cylinder liners, clutch linings. His service helps restore power and extend equipment life. Saves critical materials, too.

Association of American Battery Mfrs. Elects E. T. Foote, President

E. T. FOOTE, Vice President of Globe-Union Inc., Milwaukee, Wisconsin, manufacturers of Globe Spinning-Power Batteries, was elected president of the Association of American Battery Manufacturers at its recent annual meeting. Ed. Foote was First Vice President last year. Other officers and directors are L. B. F. Raycroft of Electric Storage Battery, First Vice President, C. L. Feldtkeller, Solar Battery Co., Second Vice President; A. H. Daggett, National Battery Co., Secretary; and L. A. Doughty, Carlisle and Doughty, Treasurer. Directors are A. J. Baracree, Am-Plus Storage Battery Co.; J. A. Minch, Electric Auto-Lite Co.; H. C. Montgomery, Hobbs Battery Co.; B. F. Morris, Thomas A. Edison, Inc.; Lester Perrine, Perrine Quality Products Corp.; and A. G. Phelps, Delco Remy Div., General Motors Corp. V. L. Smithers is Commissioner.

E. T. Foote

Briggs Clarifier Company Appoints W. J. Ewbank Chief Engineer

WALTER J. EWBANK, B.S., M.S., has been appointed Chief Engineer for the Briggs Clarifier Company, Washington, D. C. In addition to the normal duties of a Chief Engineer, Mr. Ewbank heads a department which has recently been created in a reorganization plan designed to promote more thorough cooperation between the Sales and Engineering Departments. His experience and education bid well for his successful administration of this new position.

Since joining the Briggs Clarifier Company in 1938, Mr. Ewbank has held the following positions: Head of the Chemical Laboratory, 1938-39; Assistant Chief Engineer, 1939-41; Manager of Research and Development, 1941-43; and now Chief Engineer for the company. Prior to joining the Briggs Clarifier Company, Mr. Ewbank attended Purdue University and Virginia Polytechnical Institute.

Benjamin Franklin Says—

"WHEN the government finds it necessary for the common benefit, advantage, and safety of the nation, for the security of our liberties, property, religion and everything that is dear to us, that certain sums shall be yearly raised by taxes, duties, etc. (today the etc. are war bonds) . . . and paid into the publick treasury, thence to be dispens'd by government for those purposes; ought not every honest man *freely and willingly* to pay his just proportion of this necessary expence? Can he possibly preserve a right to that character, if, by any fraud, strategem, or contrivance, he avoids that payment in whole or in part?"

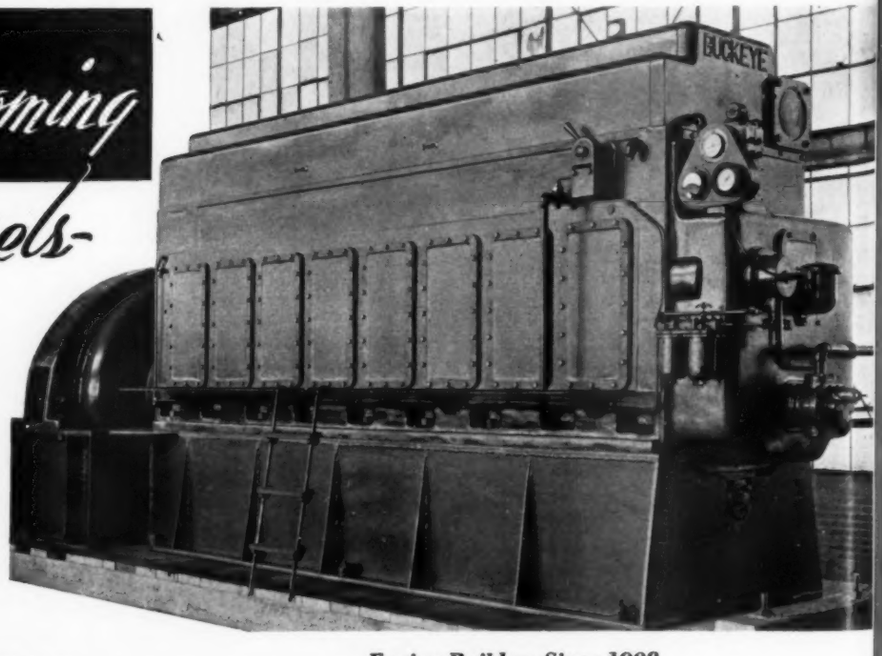
Better days are coming

Buckeye Diesels-

Buckeye Diesels built long before the war are today serving hundreds of war industries dependably and economically. Many of these industries need additional prime movers now—many others are waiting for better days to install their own power equipment. Yes, most of them must wait until we have filled the requirements of the Government—then will come better days and Buckeye Diesels will again be available to power—

Chemical Plants	Municipal Power Plants
Mines and Quarries	Municipal Waterworks
Textile Plants	Machine Tool Plants
Ice Plants	Cold Storage Plants
Rock Crushing Plants	Furniture Factories
Food Products Plants	Cotton Gins

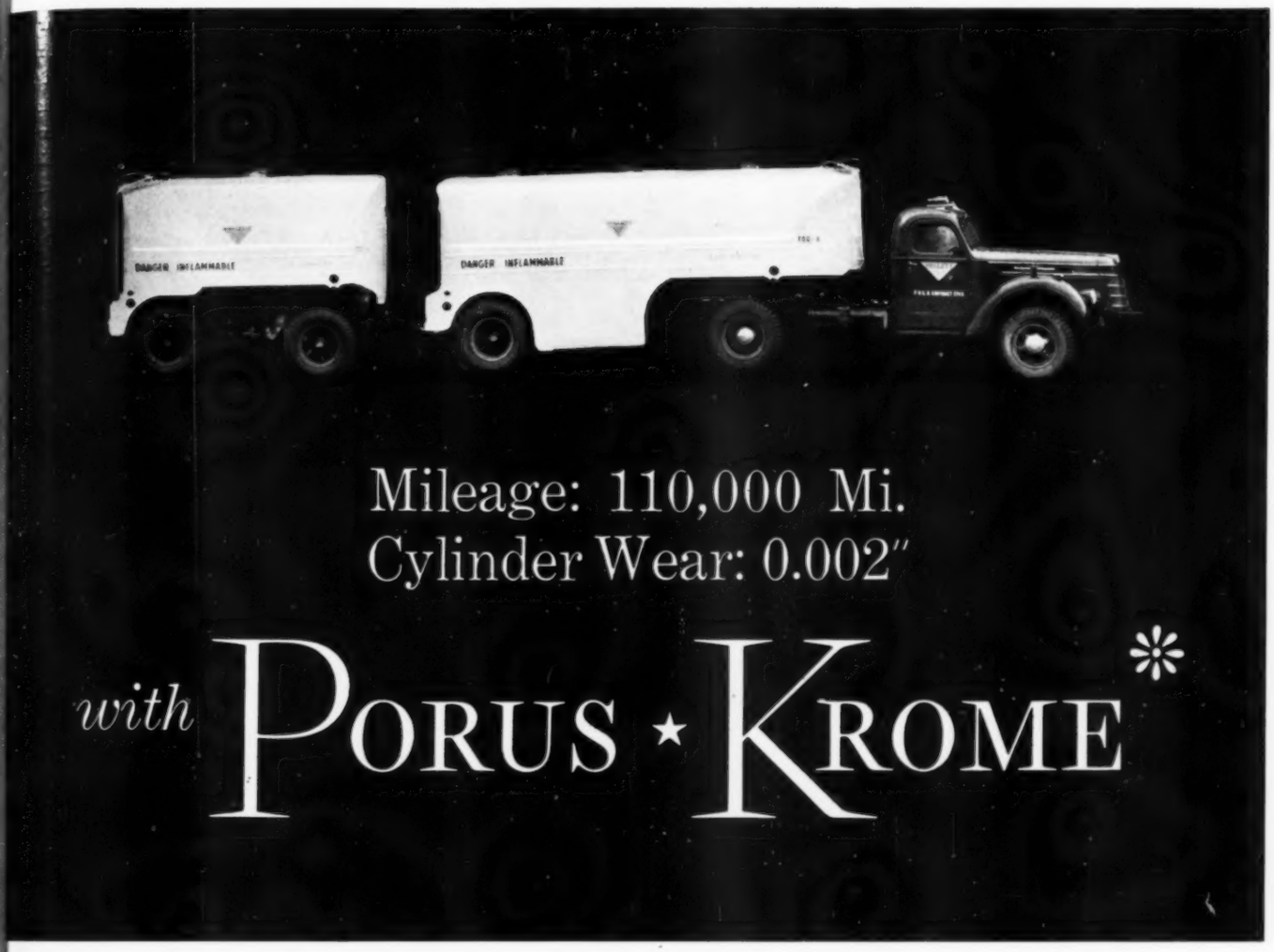
Direct Drive or Electric Units 75 H.P. to 960 H.P.



Engine Builders Since 1908

Be Profitwise and Dieselize with Buckeyes

THE BUCKEYE MACHINE COMPANY ..... LIMA, OHIO



Mileage: 110,000 Mi.
Cylinder Wear: 0.002"

with PORUS ★ KROME*

Just how good *is* PORUS-KROME?

To find out, The Willett Company, Chicago contract haulers, had Van der Horst apply PORUS-KROME to the cylinder liners of a Cummins-Diesel engine. Here is the answer given after more than a year's operation:

"These PORUS-KROME cylinder liners operated on one of our Petroleum Hauling Trains and at 110,000 miles were checked. At that time they showed wear of only 2/1000ths of an inch at the top of the liner. We are so pleased by the operation of PORUS-KROME in these cylinder liners that we would like to have some more done."

Results like this are convincing American engine users and builders that PORUS-KROME *does* multiply engine life many times, *does* make rings last longer, *does* mean more dependable operation and less frequent overhauling.

PORUS-KROME . . . an exclusive Van der Horst development, fully covered by patents . . . is available under license arrangement or through three Van der Horst processing plants.

*PORUS-KROME is hard chromium applied by a patented, precision process that develops pores to hold oil. Used on internal combustion engine cylinder bores, piston rings and other bearing surfaces, it reduces wear, corrosion and scuffing, greatly multiplying engine life.

VAN DER HORST
TRADE MARK

PORUS ☆ KROME

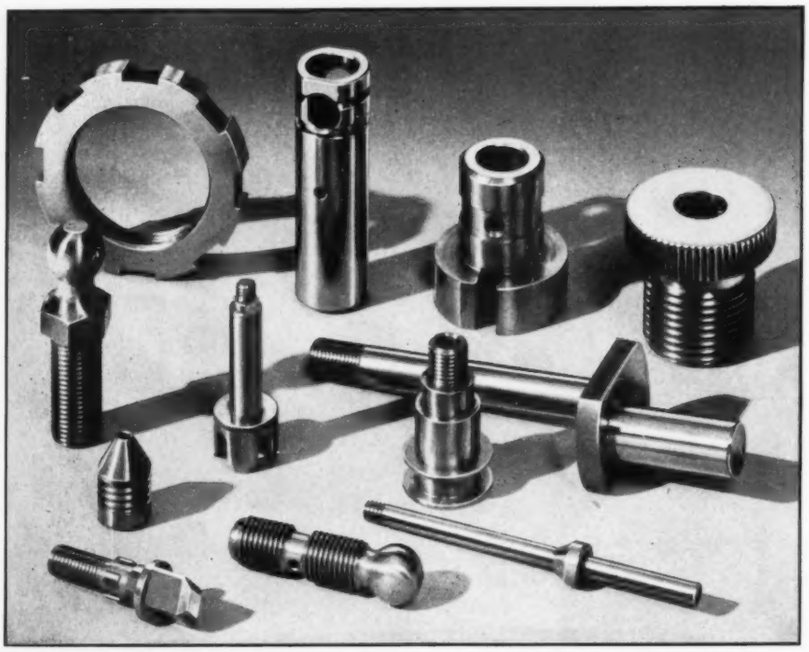
Multiplies Engine Life

VAN DER HORST CORPORATION OF AMERICA CLEVELAND, O. OLEAN, N. Y.

G.M. Cleveland Diesel Division Earns Third Star for Army-Navy E Pennant

THE addition of the Third Star to the Army-Navy E pennant of the Cleveland Diesel Engine Division, General Motors Corporation, was announced today by Rear Admiral C. C. Block, U.S.N. (Ret.). Admiral Block said, "The addition of the white star, which the renewal adds to your Army-Navy E flag, is the symbol of appreciation from our armed forces for your continued and determined effort and support so necessary for victory on our far flung fronts." George W. Codrington, vice president of General Motors and general manager of the Division, pointed out that production has been increased more than 4,000 per cent since the beginning of the defense program in 1941. He said that since November 30, 1941, "we have shipped 10,977 engines to the Navy. These engines have powered more than 4,000 units of the fleet."

Concerning production of the Cleveland Diesel Engine Division, Codrington said, "Our re sponse to the Navy's request for more and mor engines has been met each time. The fact tha we can point with pride to our standing as th foremost producer in the field of marine engi manufacturers is only because of the remarkabl teamwork of the 5,000 employees at Clevelan Diesel and the more than 94,000 employees o our subcontractors and suppliers. Each of thes persons should take personal pride in the awar because they contributed their share towar making our record possible."



"CHICAGO SCREW"

--a name to remember for Hardened and Ground Parts

We are specialists in the manufacture of all kinds of Milled from Bar and Cold Upset Products made to the most exacting mechanical specifications. Hardened and Ground Products are being turned out by the millions with secondary operations included—Milling, drilling, slotting and broaching. Internal, cylindrical and surface grinding. Thread Grinding, Thread Hobbing and Roll Threading to Aircraft Quality Standards.

THE CHICAGO SCREW CO.

ESTABLISHED 1872

1026 So. Homan Avenue Chicago, Ill.

Crocker-Wheeler Electric Division Appoints R. D. Ulrey

THE Joshua Hendy Iron Works, Crocke Wheeler Electric Division, announces the ap pointment of R. D. Ulrey as manager of thei new Los Angeles, California office.

This new office will provide coverage for South ern California, Arizona and New Mexico. B the establishment of this office, users of Crocke Wheeler motors, generators and flexible cou plings will be more promptly served in thi area. The office is located in the Pacific Mutua Building, 523 West Sixth Street, Los Angele

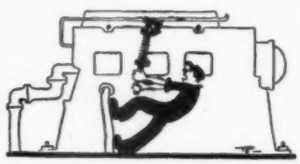
Mr. Ulrey is well known in that area as a moto and generator application specialist, having been associated with U. S. Electrical Motors o that city.

William R. Hopkins In Charge Of American Bosch Laboratory

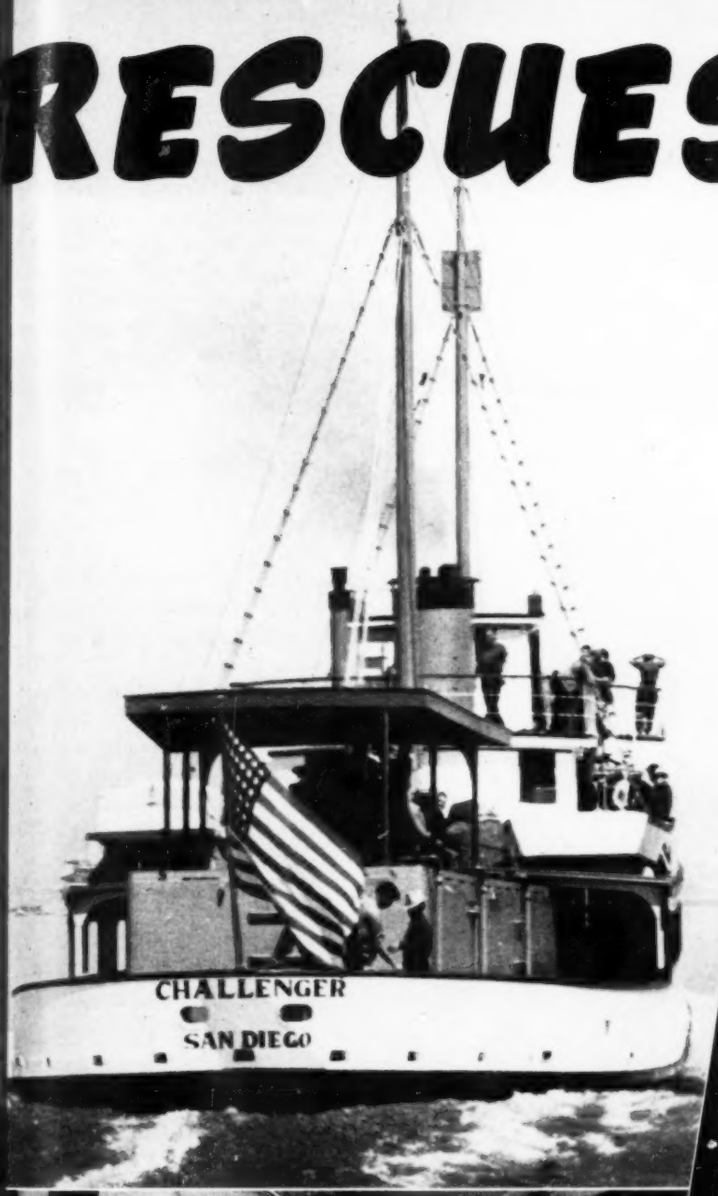
WILLIAM R. HOPKINS has been appointe Engineer in charge of the Gasoline Injectio and Control Laboratories of the America Bosch Corporation, Springfield, Mass., accord ing to an announcement just made by th company.

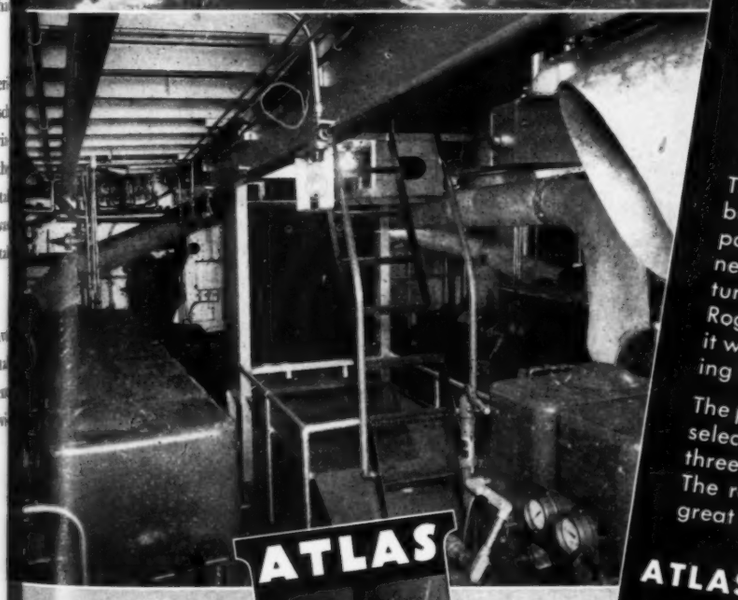
An experimental engineer of substantial experi ence, Mr. Hopkins has joined American Bosc after serving the Lycoming Division of the Avi tion Corporation for eight years, during th last three of which, he was chief experimenta engineer. Previously, from 1932 to 1935, he wa test engineer at the Air Corps Experimenta Station, Wright Field, Dayton, Ohio.

In his present position Mr. Hopkins will hav charge of laboratory testing and experimenta work on fuel injection and control equipmen for gasoline engines, in the Engineering Div sion of American Bosch.



RESCUES 11 WAR SHIPS!





When a boat is designed and built for a specific job, creditable performance is a natural expectation, but when a vessel pinch-hits in another service and turns in a remarkable record—then it's time to sit up and take notice. That's the story of the former San. Diego tuna clipper CHALLENGER, now doing herculean service for the United States Navy in the South Seas.

Her record of achievement, recently released, includes:—

- ★ **Towing to safety 11 damaged warships**
- ★ **Shelling enemy positions**
- ★ **Shooting down Japanese bombers**
- ★ **Putting raiding parties ashore**
- ★ **Landing vital supplies on Guadalcanal under fire**
- ★ **Rescuing survivors of sunken ships**

The CHALLENGER, first electric driven tuna clipper, was built by the San Diego Marine Construction Company, and powered by three heavy duty Atlas Diesels, direct connected to A.C. generators. She was regarded as the finest tuna boat sailing out of San Diego. Skippered by Joe Rogers, her peacetime record was an enviable one, and it was only natural that she was one of the first of the fishing fleet to be taken over by the Navy when war started.

The performance of any boat is largely the result of proper selection, installation, and handling of her power plant—three significant items when a vessel is fighting for her life. The record of the former CHALLENGER certainly reflects great credit upon her three Atlas Diesels.

ATLAS IMPERIAL DIESEL ENGINE CO.

OAKLAND · CALIFORNIA

NORTHWESTERN DIVISION	SALMON BAY TERMINAL, SEATTLE, WASH.
EASTERN DIVISION	115 BROAD STREET, NEW YORK, N.Y.
CENTRAL DIVISION	228 NORTH LA SALLE STREET, CHICAGO, ILL.
SOUTHWESTERN DIVISION	5726 NAVIGATION BOULEVARD, HOUSTON, TEX.

ATLAS
Imperial
DIESEL
ENGINES

ARMY NAVY

Benjamin Franklin;

. . . . *Continued from page 61* . . . .

his experiments and theories of science. He saw his first electrical demonstration in Boston in 1746 and purchased all the apparatus used by the British experimenter, Dr. Spence, and proceeded in electrical experiments of his own with great interest. The work that he did was soon far ahead of the European discoveries and Franklin stated that he had never before become engaged in any study that so totally engrossed his attention and time as electricity. With great enthusiasm, he described new discoveries that were to him unique, for he had no way of telling what work his predecessors had done. Foremost among the observations was the discovery of the action of points in drawing off and throwing off the electrical fire. In order to perform several experiments Franklin had electrified a cannon ball. When the point of a steel bodkin was brought to within six or eight inches of the cannon ball, it was observed that the ball lost its electrification immediately. The metal point had "drawn off" the "electrical atmosphere" from the iron shot. Credit for the discovery that points could, in similar fashion, "throw off" electricity belongs, however, to Thomas Hopkinson.

One of Franklin's greatest scientific achievements was his experiment with the Leyden jar which he described fully in his Letter III to Collinson. He explained the startling discovery that the electrified jar became charged positively on the outside, negatively on the inside. The inventor soon reached the conclusion that electricity was not at all created by friction, but was merely added to or taken from glass by the operation of rubbing. When the Leyden jar became charged, one side gained what the other side lost, in the same amount and the total quantity of electricity remained the same. Thus Franklin presented the law of conservation of charge for condensers.

Besides the importance and usefulness of Franklin's discoveries mentioned in his book, the world knows him well for his hypothesis concerning the electrical nature of lightning. Up to his discoveries the general impression was that lightning was caused by the explosion of poisonous gases in the air. In 1749, Franklin established that electrical fluid and lightning had similar properties of giving light, color of the light, crooked direction, swift motion, being conducted by metals, crack or noise in exploding, subsisting in water or ice, rending bodies it passes through, destroying animals, melting metals, firing inflammable substances, sulphureous smell.

The celebrated electrical kite has become a legend and in Letter XI, addressing Peter Collinson, Franklin wrote, "As frequent mention is made in public papers from Europe of the success of the Philadelphia experiment for drawing the electric fire from clouds by means of pointed rods of iron erected on high buildings, etc. it may be agreeable to the curious to be informed that the same experiment has succeeded in Philadelphia, though made in a different and more easy manner." Franklin describes the manner in which the kite was made and adds, "As soon as any of the thunder clouds come over the kite, the pointed wire will draw the electric fire from them, and the kite, with all the twine, will be electrified, and the loose filaments of the twine will stand out every way, and be attracted by an approaching finger. And when the rain has wet the kite and twine, so that it can conduct the electric fire freely, you will find it stream out plentifully from the key on the approach of your knuckle. At this key the phial may be charged; and from electric fire

SAVE FUEL WITH GUIBERSON LIGHT WEIGHT DIESEL
POWER
ESTABLISHED 1919
GUIBERSON
AMERICA'S ONLY RADIAL AIR-COOLED DIESEL ENGINE
IN TANKS • IN PLANES • IN SHIPS
The Guiberson with its amazingly simplified and efficient injection system uses only 26.2% as much fuel per hour as a gasoline engine of equivalent power. And every pound of fuel, although it costs only a fraction as much as high octane gasoline, gives 50% more power!
In planes, in tanks, and in light ships the extra power and extra range per pound of fuel of the Guiberson can spell the difference between reaching an objective or failure to complete a mission. For low-cost, dependable operation without fire hazard or radio interference, it's the Guiberson—America's only radial air-cooled diesel engine.
Guiberson U.S.A.
GUIBERSON DIESEL ENGINE COMPANY
DALLAS, TEXAS
THE GUIBERSON CORPORATION
AIRCRAFT AND HEATER DIVISION

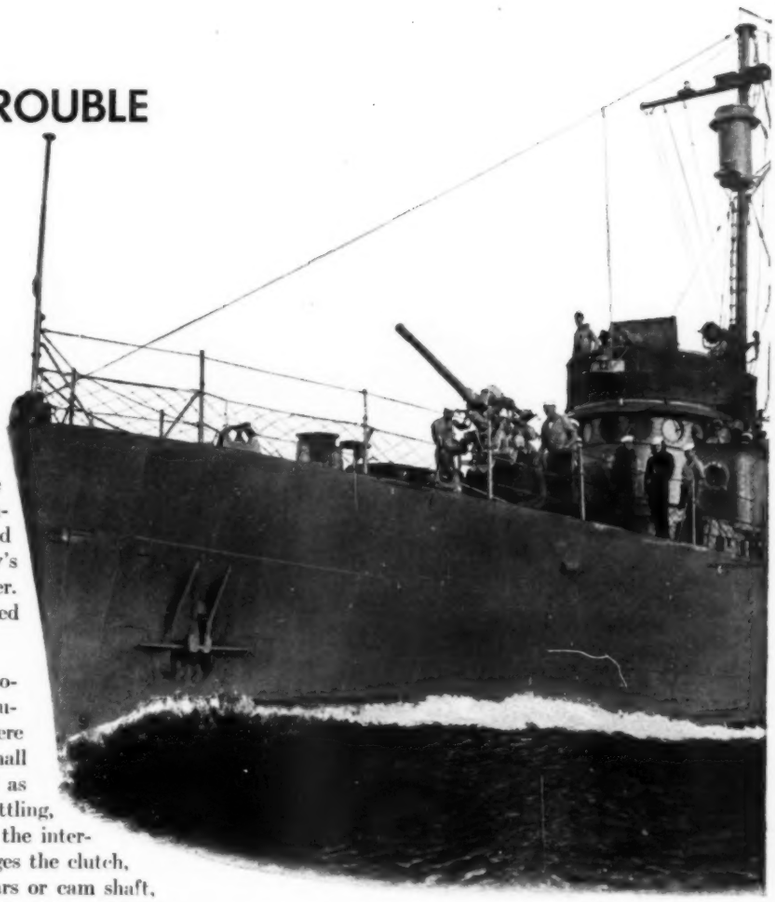
Official U. S. Navy Photo

"PC-WAB"

spells

TROUBLE

for U-Boats



PC boats . . . hard-hitting, fast-riding U.S. Navy escort vessels, similar to Britain's corvetts . . . are among the deadliest of the sub-chasers that have broken the back of the U-boat menace. They are steel-hulled, diesel-powered, well implemented with depth charges, and run by graduates from the Navy's Submarine Chaser Training Center. A number of these PC's are equipped with W·A·B Controls.

★ ★ ★

W·A·B Control Systems provide co-ordinated command of engine maneuvering operations through the mere front-to-rear movement of a small handle. Speeds can be governed as accurately as with direct hand throttling, and travel of the handle through the intermediate zone successively disengages the clutch, applies a shaft brake, reverses gears or cam shaft, releases brake and engages clutch. The sequence cannot be accidentally varied.

Control stations can be located on the bridge—in the control room—in the engine room—or a combination of these locations can be established. There are no delicate or sensitive parts to be thrown out of adjustment by jars or shocks. Distortion of the ship structure does not affect operation. Repairs require only ordinary ship-board skills.

If you are now concerned with any current or contemplated ship-building program, it will pay you to investigate W·A·B Control Systems. One of our engineers will be glad to talk with you.

Westinghouse Air Brake Company
MARINE DIVISION
General Offices: Wilmerding, Pa.
75 Years of Pneumatic Control Experience

W·A·B

Pneumatic . . . Pneumatic-Electric . . . Pneumatic-Hydraulic

remote control systems

thus obtained, spirits may be kindled, and all the other electric experiments be performed, which are usually done by the help of a rubbed glass globe or tube, and thereby the sameness of the electric matter with that of lighting completely demonstrated."

After arriving at the conclusion that lightning possessed the properties of electricity, Franklin devised the lightning rod through discoveries about points. He had found that a pointed conductor would discharge an electrified body at a great distance; thus if clouds were electrified, a pointed body would draw electricity from them. Instead of round balls of wood or metal, commonly placed on top of weathercocks, or masts or church spires, he suggested a rod of eight or ten feet in length, sharpened to a needlepoint. This, he felt, would draw electrical fire out of a cloud silently before it could come near enough to strike. At first Franklin did not mention the ground wire, but later mentioned that a wire should run down into the ground outside the object insured.

The rod soon came into use in the United States and in England. In Paris people were interested in learning about American methods of insuring homes against lightning, and Franklin wrote a paper explaining clearly the general principles involved. It was his advice that during a lightning storm one should never be near a chimney, mirror, gilt pictures, or watercot. He recommended the center of the room as the safest place. A good insurance of safety would involve several feather mattresses with chairs placed upon them (chairs being poorer conductors than walls, lightning would choose a course through the wall.) Franklin wrote that the most effective device for safety would be a "hammock or swinging bed suspended by silk cords equally distant from the walls on every side and from the ceiling and floor above and below."

Benjamin Franklin sought no profit from his lightning rod, which he refused to patent. His primary aim was only to enlarge the scientific field with a list of important discoveries, which he modestly gave the public, expecting no material reward. His copying machine, stove for burning of pit-coal and consuming all its smoke, arm for taking books down from high shelves, smokeless fireplace, woodburning stove were all some of his inventions for lightening labor which have gone a long way with the development of electricity.

Franklin's influence and fame as a tamer of lightning and contributor of electrical experiments reached from America to England and the continent. The Royal Society awarded him the Sir Godfrey Copley gold medal in 1753 and later elected him a member of the society due to his observations on electricity.

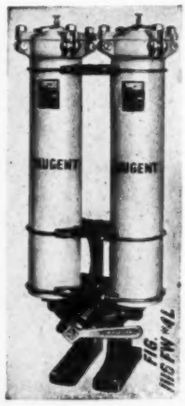
. . . serve on many "WAR-DUTY" Vessels.

Many of today's Maritime Commission Vessels are able to carry on their vital tasks with a greater degree of dependability because of Nugent Duplex Filters. These filters guard Diesel engines against dirt troubles, thereby increasing the efficiency and dependability of engine operation.

The Nugent Duplex Filter is specifically designed to meet the demands of Diesel operators who can't take a chance with power interruptions. The Duplex construction makes it easy to maintain continuous protection year after year.

An important feature of Nugent Filters is their ability to remove dirt and foreign material from lubricating oils without removing essential additives.

Write today for details on the use of Nugent Filters for fuel or lubricating oil.



NUGENT Patented Pressure Filters have 20 TIMES MORE ACTUAL FILTERING AREA than most filters of comparable size.

Nugent's special woven, acid resisting, lintless textile filter element removes particles as small as .0003" to produce 99-8/10% clean oil.

WM. W. NUGENT & CO., Inc.
415 N. Hermitage Ave.
Chicago 22, Illinois

Industrial Equipment Co., 6435 Hamilton Ave., Detroit 2, Michigan. H. J. Kelley, 816 Harvard Ave., New Orleans 13, La. Thos. A. Short Co., 245 Fremont St., San Francisco, Calif. Dallas S. Deem, 1215 So. St. Louis Ave., Tulsa 5, Oklahoma. Harlan G. Bosler, 4452 W. 59th Pl., Los Angeles, Calif. In Canada—Darling Bros., Ltd.

NUGENT FILTERS

Glen G. Holt

GLEN G. HOLT, Sr., vice president of the Perfex Corporation, died at the age of 47 years on November 26th.

Mr. Holt was widely known in the automotive field and was an authority on radiators. Before coming to the Perfex Corporation in 1934 he was associated with Lavine Gear Company for 16 years. He was an Associate Member of the Society of Automotive Engineers since 1937. He was a native of Salt Lake City.

Army Safety Flag Awarded To Globe-Union Inc.

ON December 9th, Globe-Union Inc., manufacturers of Globe Spinning Power Batteries, were the recipients of the Army Safety Award. This award for the lowest accident frequency rate is made by the U. S. Army to encourage higher standards of safety in the production of war material and is given jointly to both management and labor in order to foster a closer spirit of cooperation.

Globe-Union Inc. is not only the first Milwaukee manufacturer to receive the Army Safety Flag but also the first plant wtih 2,000 to 4,000 employees in the Wisconsin-Upper Michigan Division of the 6th Service Command, to be so honored.

C. O. Wanvig, Pres. of Globe Union, Inc. and Col. W. H. McCarty.

Presentation of the Flag was made by Col. W. H. McCarty, for the Army, to Mr. C. O. Wanvig, President of Globe-Union Inc. and Jeanette Therwachter, representing the employees.

Among those present at the ceremony were Mr. Voyta Wrabetz, Chairman, Wisconsin Industrial Commission, Mr. Clifford Boulet, President of Wisconsin Council of Safety, Mr. W. B. James, President, Wisconsin Manufacturers' Association, and Capt. F. M. Wright, Chief of Safety and Health Division, of the Wisconsin-Upper Michigan District of the 6th Service Command.

Fairbanks-Morse Announces Changes in Personnel

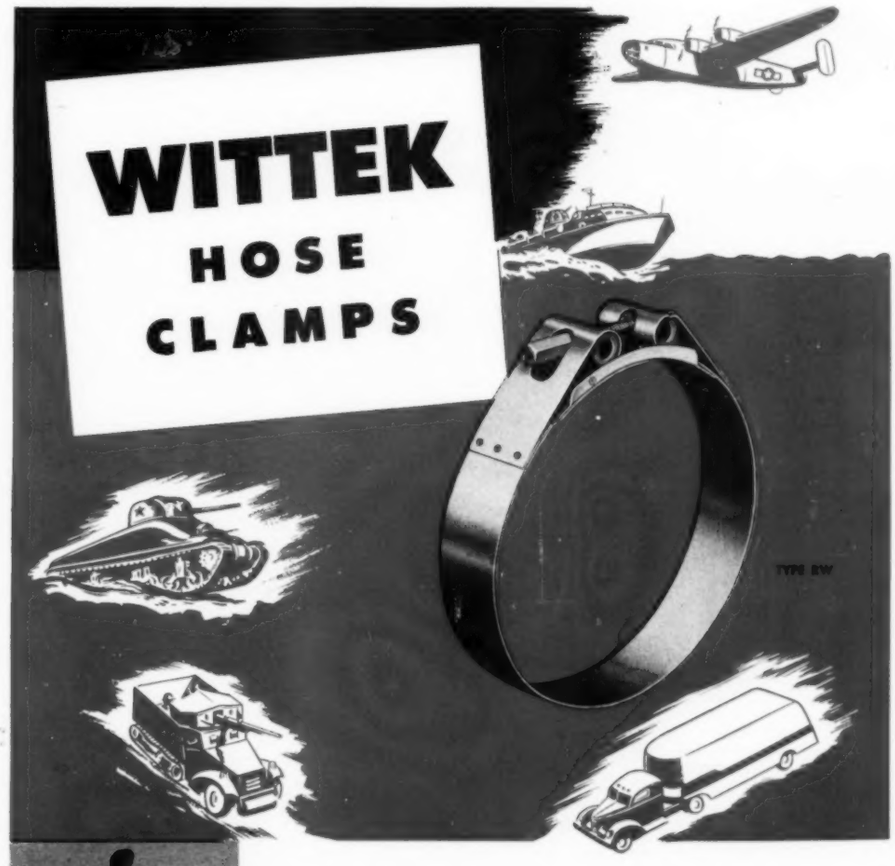
CHANGES in personnel have recently been announced by Mr. R. H. Morse, Jr., General Sales Manager, Fairbanks, Morse & Co., Chicago, Illinois. These changes are as follows:

Mr. O. O. Lewis, formerly Branch Manager, Atlanta, Georgia has been promoted to the position of Assistant General Sales Manager of the company, Chicago, Illinois.

Mr. V. O. Harkness, former Manager of the company's Branch at Dallas, Texas, has been appointed Manager of the Diesel Engine Sales Division, Chicago.

Mr. H. J. Renken, former Manager of the Oil Field Division at Dallas, has now been made Branch House Manager of the company's Dallas Texas Branch where he will also continue to serve as Manager of the Oil Field Division in connection with his new duties.

Mr. G. N. Van Epps, formerly Manager of the Diesel Department, Chicago Branch, has been promoted to Manager of Branch at Atlanta, Ga. Mr. J. S. Peterson, formerly Scale Department Manager of the Cincinnati Branch, has been promoted to the office of Branch Manager replacing the late Mr. Stanley Eaton.



FOR DIESEL APPLICATIONS

Strong—Dependable—Easily Installed

The dependability of Wittek Hose Clamps, long accepted by the automotive and aviation industries, is now being proven by actual service with the armed forces of the United Nations as standard equipment for aircraft, tanks, jeeps, trucks, ships and other combat vehicles. Wittek Hose Clamps are made in many different sizes and types for Diesel applications: Type RW for hose connections of 5" in diameter and larger; Type RM for 3½" to 5"; Type RN for 2½" to 3½" and Type FBC for 2½" hose connections and smaller. Write for new descriptive catalog. Wittek Manufacturing Co., 4305-15 West 24th Place, Chicago 23, Illinois.

WITTEK HOSE CLAMPS
Dependable Hose Connections

Diesel Freight Locomotive Makes Spectacular Run

A FORECAST of the new level of railroad service that will be possible after the war as the result of the further application of the Diesel locomotive is contained in a new record for freight train performance just announced by the Boston and Maine Railroad.

A regularly scheduled Boston and Maine freight train with a 5400 horsepower General Motors Diesel locomotive was run non-stop from Boston to Mechanicville, N. Y., a distance of 189 miles in six hours and 25 minutes. The regular time on this run for this train with the motive power which Diesel displaces is 10 hours. The record breaking run was made with 125 cars, totaling 3,839 actual tons. The average train hauled in 10 hours by the former motive power totaled an actual 3000 tons and required helper locomotives to get over two grades. The record breaking Diesel run was made without helper locomotives.

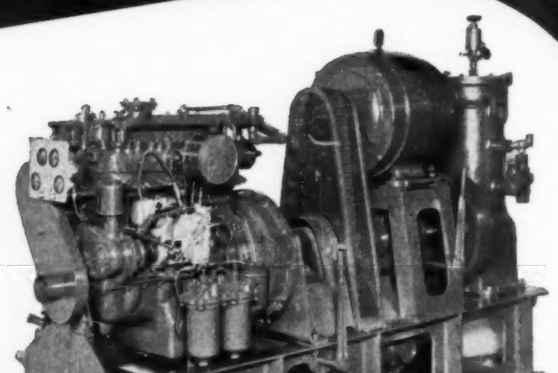
The Boston and Maine's new 5400 hp. General Motors Diesel freight locomotive.

The Boston and Maine has ordered 12 of the GM Diesels, two of which have been delivered. A third is scheduled for delivery before the end of the year. The locomotive which set the new non-stop record is a standard 5400 horsepower GM Diesel. More than 70 of these locomotives are in service on ten Class I railroads in all sections of the country. Many of them have been assigned to mountain divisions to speed movement of heavy war freight trains. Records have been set in such service but they are withheld as military secrets.

REINER *Made to Order*

Diesel Marine Auxiliary Units and Generating Sets

"Made to order" . . yes, even in these days when mass production from the assembly lines is the expected method, Reiner Diesel Marine Units and Generating Sets are "made to order" to fit auxiliary requirements exactly. That's what makes them the better buy . . what has influenced such exacting buyers as Army, Navy, Coast Guard and Maritime Commission to accept Reiner.



REINER Marine Auxiliary Unit.

JOHN REINER & COMPANY
12-12 37th AVENUE, LONG ISLAND CITY 1, N. Y.

1-RC-3

Drayer & Hanson Inc. Appoints J. C. Lewis

APPOINTMENT of J. C. Lewis as field representative for the states of Arkansas, Louisiana, Texas and Oklahoma has just been announced by Drayer & Hanson, Inc., Los Angeles, California, manufacturers of Heat Exchange Equipment.

Mr. Lewis, who has been employed in the Sales and Engineering Departments at Los Angeles, will maintain his headquarters for the new territory in Austin.

The appointment comes as a part of a general expansion program of the company, whose refrigeration, air conditioning, and general industrial products are evaporative coolers designed for industrial application.

Buckeye Machine Issues New Bulletin

THE Buckeye Machine Company has just announced a new bulletin featuring its Model "80" Diesels. This thirty-page booklet with plastic binding and attractively illustrated in four colors details all of the components of Buckeye Model "80" Diesels with clear cut halftones and easy-to-read explanatory text and carries sectional line drawings on which the water, lube and fuel systems are traced in colors. Performance curves are given and the booklet carries a special message to executives and engineers. A copy of Bulletin 805 will be mailed upon written request, (use your letter head) to The Buckeye Machine Company, Lima, Ohio.

SAE Planning Wartime Engineering Meeting with Discussion of Post-War Implications

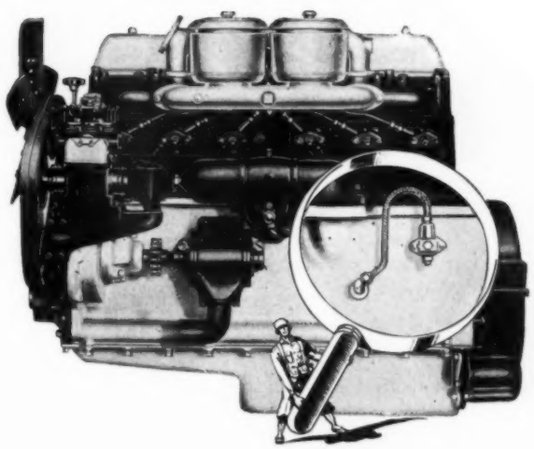
Service of Engineers to American Military Yielding Important Peace-Time By-Products

PROGRAM for the annual meeting of the Society of Automotive Engineers, scheduled for Jan. 10-14 in Book-Cadillac Hotel, Detroit, is being developed to make the gathering a practical wartime engineering conference with post-war implications, it has been announced by General Manager John A. C. Warner.

The SAE War Engineering Program has enabled automotive engineers to render valuable advisory services to the military, and their work is yielding by-products of real post-war value," explained Mr. Warner. "These post-war potentialities became so obvious in preparing the program, that it was decided to make them a part of general automotive engineering knowledge."

Tentative program calls for more than 25 discussional sessions, with technical papers on aircraft, aircraft engines, Diesel engines, fuels and lubricants, automotive transportation and maintenance, parts reclamation, trucks and buses, and materials. Featured will be discussion of both wartime and post-war engineering uses of materials, including aluminum, magnesium, synthetic rubber, plastics, and steel, with emphasis upon materials which are new and upon new applications, adaptations, and uses of old materials.

One session will be devoted to discussion of methods of expediting wartime production, another to possible peace-time methods of planning production to make the most of materials, machines, and processes. Post-war implications will be revealed in discussions of future passenger cars and trucks and of materials available for use in their construction. Both wartime and post-war problems are considered in technical papers on vapor lock winterization, and practical types of engines, fuels, and lubricants.



THIS is what we're talking about

It's a VISCO-METER* installation on a Diesel Engine. It wouldn't look any different on a gasoline engine. Engines that could be powering your car, an Army Jeep, a motor ship or a farm tractor.

You are looking at a 12 ounce guardian of engine life, operating efficiency, operating economy. While the VISCO-METER* is simplicity itself in both design and operation, the technical story of its adaptation to *your* engines is something we should discuss together.

If you are concerned with the design, manufacture, sale or operation of engines and are interested in protecting them from lubricating troubles then we invite you to write, wire or telephone us today for VISCO-METER* literature or tell us when you want a VISCO-METER* engineer at your office.

VISCO-METER
CORPORATION GROTE ST., BUFFALO 7, N. Y.

*Fully covered by U. S. and Foreign Patents

A New Name for One of America's Oldest Filter Manufacturers

STAYNEW Filter Corporation of Rochester, N. Y., will henceforth be known as Dollinger Corporation, taking this name from Lewis L. Dollinger, president and founder of the company.

Recently expanded manufacturing facilities have made possible the development of new products which are soon to be announced.

Since certain of these are products other than filters, it seemed advisable to change the company name to one of a more general character.

The well-known Staynew and Protectomotor trade-marks will continue to be used in connection with all filter products.

There is no change whatever in the management, financial organization, or general policies of the company.

Lewis L. Dollinger

Ohio Crankshaft Appoints Detroit Distributor For Tocco Equipment

ANNOUNCEMENT of the appointment o The Welker Machinery Company, Inc., Detro Michigan, as special distributor for TOCC Process induction equipment has been made b Mr. Wm. C. Dunn, President, The Ohio Cran shaft Company, Cleveland 1, Ohio, originat of the TOCCO Process of Induction Heatin

The appointment of the Detroit company brin to eight the number of nationally known m chine-tool distributors now handling th TOCCO line. The Welker organization wi serve the Michigan manufacturing area.

Paper Packs a War Punch: Don't Waste It!

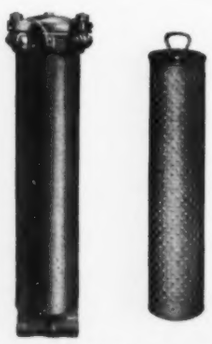
AMMUNITION, weapons, food and, of coun precious blood plasma, reach our boys in th front lines in perfect condition. Why? Becau practically every one of the 700,000 differe items shipped overseas is protected by pape Paper also does an important job in war pr duction, taking the place of even more criti materials. Paper, in good truth, packs a terri war punch. Paper is a victory essential. It's t to all of us, then, to help conserve paper. Wh you finish reading this copy of DIESE PROGRESS pass it along for others to re Make your writing paper stretch. While sho ping, help your storekeeper save paper by n asking for useless or double wrapping for yo purchases. Back up the manufacturers' effo to save paper by cheerfully accepting simp wartime packaging. And be sure to save eve bit of used paper for your local paper salva drive.

CONTINUE TO PROTECT YOUR ENGINES

When Servicing Your Filters Insist on Genuine MICHIANA *Elements*

With conserving of critical metals still important, it is your job to prolong the life of your engines. With man shortage still more acute, the need for insuring maximum dependable engine performance is more urgent than ever.

To be sure of dependable engine performance,—to reduce needless shutdowns and repairs,—always replace the filter elements of your MICHIANA Oil Filters with genuine MICHIANA Elements,—designed expressly for these filters. No other Elements have the high dirt-absorbing capacity provided by MICHIANA Wastex filtering material. MICHIANA PRODUCTS CORPORATION, Michigan City, Ind.



No. 17050 (163HP) Filter with single Element. This standard Element is employed in groups for filters up to 3266HP. When making Element replacements, you can be assured best results by using genuine MICHIANA Elements.

MICHIANA OIL FILTERS

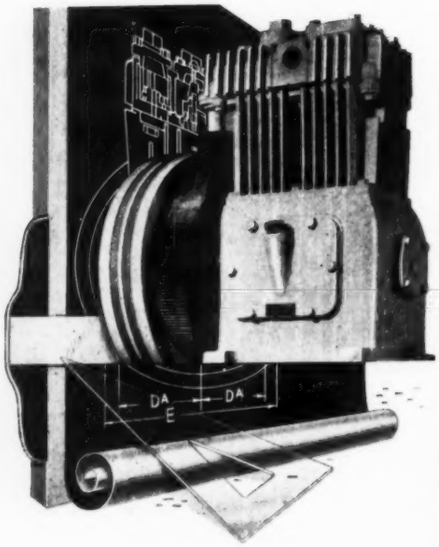
Built to set the pace

and HOLD IT!

After more than a decade of service in all types of heavy-duty automotive, industrial and marine equipment on the kind of jobs that really put power "through the wringer" — this fact about Cummins Dependable Diesels stands out like an unbroken window in Berlin: They are built to set the pace in dependability, economy and speed — and hold it! Day and night...until the job is wrapped up and delivered.

CUMMINS ENGINE COMPANY

Columbus, Indiana



Modern Design

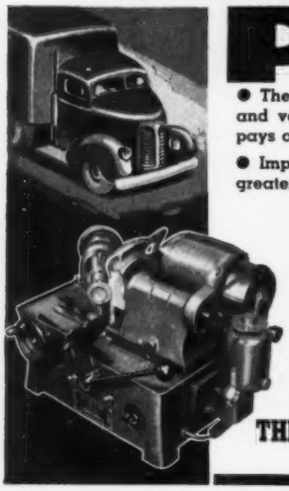
☆ INSIDE AND OUT ☆

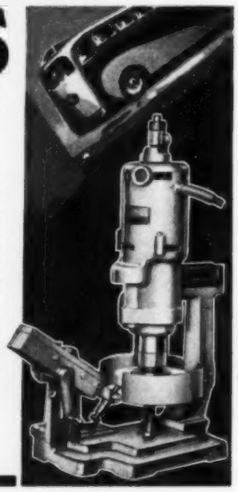
Modern, improved design—inside and out—results in greater over-all efficiency for Quincy Compressors. Cooling area is increased 12%. Construction is simplified. Lubrication is more thorough . . . more positive. The policy of building air compressors exclusively has helped to make the name "Quincy" a symbol for dependability. Quincy Compressors provide dependable air supply for Diesel starting and other services requiring intermittent pressures up to 500 lbs. per sq. inch. If you have compressed air problems in connection with war work, *let us help you solve them.*

Quincy COMPRESSORS

QUINCY COMPRESSOR CO., Dept. K-13, Quincy, Illinois

HALL PRECISION PAYS





● The finer precision—the finer finish—of valves and valve seats ground with HALL equipment pays and pays BIG!

● Improved engine performance LONGER; greater economy LONGER; valve jobs required LESS OFTEN; the job done FASTER with less labor cost and a minimum of grinding wheel wear; less frequent need for redressing wheels with the diamond dresser; these are just a few of the ways in which HALL precision pays.

● HALL Valve Servicing Equipment is made for all types of internal combustion engines. We'll be glad to send you complete information if you'll request it.

THE HALL MANUFACTURING CO.
TOLEDO 7, OHIO

Diesel to Play Major Role in Northwest Postwar Fishing and Alaskan Trade, W. H. M. Porter Says

TWO important and significant trends in the Northwest marine Diesel industry are reported by W. H. M. (Bill) Porter, district manager of the Enterprise Engine & Foundry Company in Seattle, Washington.

W. H. M. Porter

Porter observes that in order to aid with wa time food production and to improve the peac time fishing fleet, many Diesel fishing craft a being built in Puget Sound Yards. At the sam time, postwar construction of Diesel-engine freight and passenger vessels for the anticipate enlarged trade with Alaska is being given se ous consideration. The use of Diesel propulsio power for ships in this commerce started a fe years prior to the war with the Northlan Transportation Company one of the pioneer

Based on a long and interesting career in th Diesel industry, Porter predicts the use of th type of power will assume greater proportion in the Northwest of the postwar era. Originall from Minneapolis, Minnesota, often terme "The Gateway to the Northwest," he located i Seattle in 1929 as representative of Enterpris

His background in the industrial power fiel includes association with the tractor, gas engin and railway motor fields. In World War I h spent twenty-two months in the army, partic pating in the famous Meuse-Argonne offensiv Returning from service, he joined the Weste Machinery Company, assembling and testing g engines. In 1924 when the company merge with the Enterprise Engine Company he wa placed in charge of the test stand where Dies

engines were developed.

During the past two or three years he has been travelling extensively supervising Diesel installations in an area extending from Victoria, B. C., to Coos Bay, Oregon, with the addition of two trips to Connecticut to work on some naval Diesel installations.

While Porter says in early days he met considerable skepticism concerning Diesel engines in the Northwest, the splendid work being performed by this type of power during the war is broadening the field and he believes the Diesel industry is in its infancy.

Although most of his work is considered vital military information, one of the most interesting recent installations was fitting an Enterprise 2000 horsepower engine in a twin-screw tug operating in the upper reaches of the Columbia River hauling high octane gasoline. At the present time, twenty tugs in Northwest yards, destined for duty from Nome, Alaska to Australia, are being powered with 1200 horsepower Enterprise Diesel Engines as are many types of smaller craft.

New Slide Rules Now Available

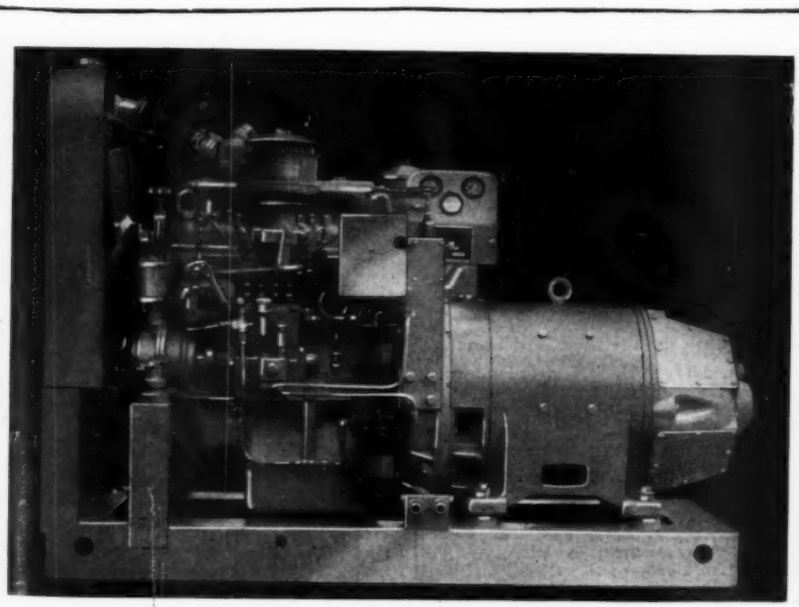
THE Frederick Post Company of Chicago has just recently announced the availability of three new slide rules—one for the professional draftsman, one for the apprentice draftsman or student and also a handy five inch pocket slide rule.

All three of the rules contain the scales A, B, C, D, CI, K, S, L and T. With exception of the apprentice rule they are celluloid faced—the apprentice rule has a painted face.

These rules have been produced as an emergency measure to meet the tremendous demand. They are well constructed, accurate slide rules and come equipped with a case and instruction sheet on the complete operation of the slide rule.

Engineering, drafting, accounting, estimating and sales departments will more than welcome this news of the availability of slide rules.

For further details and information just write the Frederick Post Company, Box 803, Chicago 90, Illinois.



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5 KW. TO 100 KW.

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Lansing, Michigan

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***Removes* ONLY Impurities**

Many of today's best lubricants contain detergent additives, put there to prevent varnish formation. W.G.B. Clarofiers, with their deep cartridge of selected cotton, do not remove this protection. But they do take out the water and sulphur compounds (which combine to form destructive acids), also the grit and colloidal carbon which start oil breakdown.

It will pay you to insist on W.G.B. Clarofiers for gas and Diesel engines. You will find them sturdy, simple, efficient, and inexpensive to service and refill.

A fine book, explaining the mechanics and theory of W.G.B. clarification, and picturing all models will be sent you free on request.

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Send me FREE your portfolio telling what is new in Engine Indicator Design and Application

NAME POSITION

COMPANY

CITY STATE

DP

Benjamin Franklin Says—

FROM a letter to his daughter, "The war may in some degree raise the prices of goods, and the high taxes which are necessary to support the war may make our frugality necessary; and, as I am always preaching that doctrine, I cannot in conscience or in decency encourage the contrary, by my example, in furnishing my children with foolish modes and luxuries. I therefore send all the articles you desire, that are useful and necessary, and omit the rest: (the rest were lace and feathers)."

Diesel Landing Vessel In the Thick of It

EMPLOYEES of the Detroit Diesel Engine Division of General Motors have been informed that the Presidential Unit Citation has been awarded to Landing Craft Infantry vessel No. 1, a ship powered by engines built by the local organization. This is the first landing craft to receive this citation.

L.C.I. vessel No. 1 back in active duty after receiving Presidential unit citation for outstanding service. Craft of this type are powered with the "Quad" multiple Diesel unit built by Detroit Diesel Division of General Motors.

The L.C.I. boats are the large sized boats specially designed by the U. S. Navy to land infantry in large scale operations. They got their

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Class S.F.
LUBRICATORS
A modern lubricator for modern service on Diesel, gas, steam engines and compressors. Supplies dependable cylinder lubrication in metered quantities reducing friction and wear. Capacities: 2 to 24 pt. and 1 to 16 feeds. New catalog on request.
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ALL KINDS MOLDED RUBBER
GASKETS FOR NEW ENGINES
AND REPLACEMENT
BUCKEYE RELINER PRODUCING CO.
LIMA OHIO

OUR 82ND YEAR
PICKERING GOVERNOR CO.
PORTLAND, CONN.

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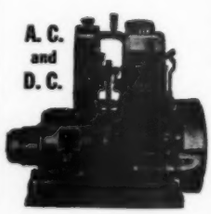
WITTE DIESELECTRIC PLANTS



For 73 years the WITTE plant has been serving America and the World.

Today WITTE is producing only for the War Effort. After Victory these improved WITTE plants will be available to all.

Remember us then.

WITTE ENGINE WORKS
LARGEST BUILDER OF SMALL DIESELS
KANSAS CITY, MO., U. S. A.

FOR THE OIL GASOLINE & WATER CONNECTIONS
VELLUMOID
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Always Use VELLUMOID

VELLUMOID Gaskets have been standard equipment on Diesel engines for more than 30 years. Sheets or ready cut gaskets for all types of engines.

THE VELLUMOID CO., WORCESTER, Mass. & DETROIT, Mich.

first full scale baptism of fire in the African landings, although they had figured in numerous operations in other theaters prior to that. They have been mentioned frequently in the dispatches since the Sicilian landing.

The power plant of the L.C.I. centers around the unique General Motors Quad, an arrangement of standard six cylinder 71 series General Motors Diesel engines.

The Army and Navy Register describes the action which resulted in the citation as follows:

"As the LCI (L) No. 1 was speeding under heavy enemy fire toward Gaffi Beach during the initial leading operations, a bullet struck the sailor at the speed controls. He fell forward and in so doing hit the engine room telegraph control, jamming it to 'Full speed Ahead.' In the same barrage the helmsman was wounded and knocked unconscious, leaving the wheel unmanned. At the same time, the winchman, whose assignment was to drop the stern anchor used to pull the ship off the beach, was shot before he let the anchor go. With nothing to retard its speed, the ship ran up on the beach, where she swung broadside and grounded. During four days, while their vessel lay helpless under repeated air attacks, the crew gallantly stood by their guns and returned hostile artillery and machine-gun fire and managed to silence several enemy guns. At the end of that time, she was refloated, repaired, and returned to active duty."

Benjamin Franklin Says—

"IT is undoubtedly the duty of all persons to serve the country they live in, according to their abilities; yet I sincerely acknowledge, that I have hitherto been very deficient in this particular . . . I now take up a resolution, to do for the future *all that lies in my way* for the service of my countrymen."

Highest Quality Gaskets & Oil Seals by **FITZGERALD**

Gasket Craftsmen for 38 Years

Gaskets of all types and materials to give reliable service under all Diesel operating conditions.

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DIESEL ENGINES

Large selection—All sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—also boilers, steam engines, turbo generators.

Complete information on request.

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75 H.P. Slow-speed Diesel Engine. Principals only. Full particulars, and price. Box 806, Suite 1800, Times Building 18, New York.

GRADE NO. 1000

A special FINE valve grinding or finishing compound recommended by Mfrs. and users of diesel engines for "lapping in" or "finishing" injector seats and injector valves. Trial can ..... $1.00 prepaid

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TUTHILL'S COOLANT PUMP LAUGHS AT CHIPS AND GRIT

No pump "absentee-ism" to slow up wartime production where Tuthill Model M Coolant Pumps are on the job. This internal-gear rotary pump has a built-in automatic by-pass that allows small chips and similar particles to pass through without serious injury to working parts. This exclusive safety feature assures long, dependable uninterrupted service. Sizes from 1 to 50 g.p.m. Available in stripped form for direct incorporation into the design of the machine. Write for complete catalog.

TUTHILL PUMPS ARE SERVING ARMY NAVY • AIR FORCE • MERCHANT MARINE

TUTHILL PUMP COMPANY

939 East 95th Street • Chicago 19, Illinois

Atlantic Seamless Flexible Metal Hose

is highly recommended by leading Diesel Engine Manufacturers, Naval Architects and Engineers for

Diesel Exhaust and Air Intake

Absorbs vibration. Can't leak or burn out. No joints to loosen. No packing to rely on for tightness. In sizes 1" to 36" I.D., inclusive. With forged steel flanges or nipples in lengths desired, straight or bent to your specifications. Atlantic Hose is widely used in Industrial Plants, on Railroads, in Marine service and by the United States Navy.

For complete information write for our Bulletin 10-B.

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★ More than a quarter century of specialized heat transfer experience—that's the heritage of every YOUNG product. Whatever your engine cooling problems may be—let YOUNG engineering research and manufacturing facilities solve them practically and economically. YOUNG offers a complete line of Oil Coolers. Radiators for Diesel, Gas and Gasoline Engines • Intercoolers • Heat Exchangers • Engine Jacket Water Coolers • Aircraft Heat Transfer Units • Unit Heaters • Convectors • Condensers • Evaporators • Air Conditioning Units • Heating and Cooling Coils.

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Young SERVICE

WAR-TIME SHORT CUTS FOR Diesel OPERATORS

How to Clean Your Diesel Air Filters!

Dust-laden air can cause much damage to a Diesel engine within a few hours of operation. That's why it is so essential to clean your air filters regularly with a SAFE, specialized material.

Just immerse filters in recommended Oakite solution as directed. You will find that thorough Oakite cleaning action quickly, completely removes ALL dust, dirt and other matter . . . helps you obtain the pure, cool air so essential to the efficient operation of your Diesel. For FREE, complete details, write today!

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Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE *Specialized* CLEANING
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

Perfect Circle Elects Daniel C. Teetor Vice President William B. Prosser and William J. Cramer Appointed To Higher Positions

DANIEL C. TEETOR, for many years a Director and General Factory Manager of The Perfect Circle Company, has been elected a Vice-President. In this new position he is the second Vice-President and the third ranking officer of the corporation, in complete charge of all manufacturing operations in all plants.

At the same time, William B. Prosser and William J. Cramer were named to new positions. Since 1928 Prosser has been Manager of the Tipton Plant, Sales Manager of the Standard Equipment Division, and Manager of Richmond Plant. He now becomes General Factory Manager and will make his headquarters at the general offices at Hagerstown.

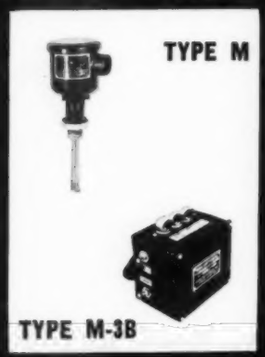
William Cramer, a veteran Perfect Circle executive, who has been second in command at the Richmond Plant since it started, becomes Manager of this plant. Previous to his connection with the Richmond Plant, Cramer was General Factory Engineer of the Hagerstown Plant.

Bardeo Appoints Export Distributor

THE Bardco Manufacturing and Sales Company, Los Angeles, California, and the Snow Irrigation Supply Division of the Bardco Company announced recently completion of arrangements with Frazar & Hansen of San Francisco to handle their export business.

Frazar & Hansen, pioneer international exporters, with headquarters at 301 Clay Street, San Francisco, will represent the complete line of Bardco electrical equipment, including motor generators, generating sets and fully automatic standby power units, equipment produced in the Bardco firm's own Pacific Coast plants as well as in Dayton, Ohio. Frazar & Hansen likewise will handle the full range of Snow gates and valves for irrigation needs.

CONTACT MAKERS



ENGINE ALARM SYSTEMS

Type M Thermostatic or Pressurestatic Contact Makers are manufactured in accordance with strict standards for lubricating-oil or circulating-water systems for all types of stationary or mobile engines and equipment. Now supplied in sheet-steel housing to avoid critical materials. Complete alarm system combines Type M-3B combination pressure control, junction box and visual indicator, together with Type M Thermostatic Contact Maker, and signal howler. (Type C Contact Makers recommended, however, for water- and weather-tight use.) Specifications upon request.

VIKING INSTRUMENTS, INC.
411 Fairfield Ave., Stamford, Conn.

Pierce Governors
Standard Equipment on the world's leading Diesel Engines!
THE PIERCE GOVERNOR COMPANY
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MANZEL
FORCE FEED
LUBRICATORS
for Most Efficient Diesel Lubrication

Under the severe strain of war-time operation, Manzel Model 94 Lubricators are establishing an enviable record in warships, corvettes, and Liberty Ships.

Manzel Lubricators' simple design and sturdy construction result in thousands of hours of dependable operation under the most grueling conditions without attention except to maintain the oil supply. Manzel-equipped Diesels operate longer without overhaul and at a higher degree of efficiency.

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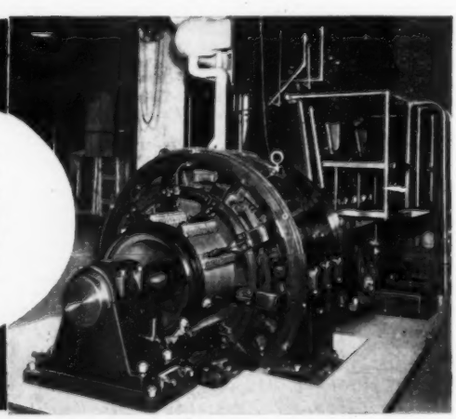
BURKE A·C–D·C GENERATORS

BURKE, not one of the biggest names in generator construction, but certainly one of the oldest, has always been known for quality rather than quantity. Today, with the spur to more power in a hurry, Burke quality goes into 24-hour production lines to provide Diesel Engine users with a husky well-built A.C. or D.C. Generator or Motor to meet any specified conditions up to 1000 K.W. or 1000 H.P. *Write for specific information.*



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Gray Marine Diesels
Based on the Engine design and built by General Motors adapted and equipped for marine use by Gray.
1 to 6 cylinders, 25-165 H.P.
Both Rotations
Reduction Ratios to 4.41
Fresh water cooling is standard
GRAY MARINE MOTOR
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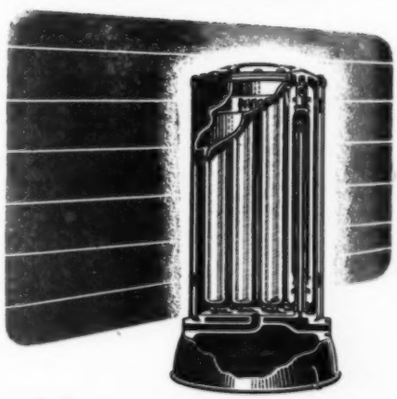

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